

INFECTIOUS DISEASES
AND THEIR
PREVENTIVE TREATMENT

E. C. SEATON, M.D.



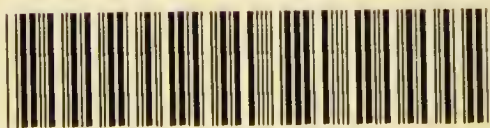
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BY

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PREFACE

THE writer of this book has, after much consideration, been induced to publish it in order that the Chadwick Medical Lectures for 1910 might be available for County, Borough and District Councils, Joint Hospital Boards, and the very numerous committees and officials concerned in Public Health and Hospital administration. The Board of Studies in Public Health of the University of London found considerable difficulty in obtaining a lecturer upon the subject defined by the Chadwick Trust. It became desirable, therefore, to widen its scope in a manner that would comply with the spirit of Sir Edwin Chadwick's intentions.¹ He (Chadwick) was a great administrator, and therefore to bring subjects of Public Health administration before the public in an independent manner seemed to be obviously in accordance with the spirit and intentions of the Bequest. There are many series of lectures given under the Bequests of the Royal College of Physicians and other eminent public bodies that deal with advance in knowledge, chiefly in the realm of Pathology, the study of which subject, being, as it is, at the foundation of Public Health, is of supreme importance. There is, however, another branch of knowledge which may be not inaptly termed the SCIENCE OF ADMINISTRATION. This subject is very seldom discussed by those who have had actual experience of administration. For these reasons, the writer was very pleased to accept the honour conferred on him by the request of his colleagues to give these Lectures—that honour being augmented, as it was, by the invitation of the University of London itself.

In this place it would be well to consider the reasons for taking as the subject of this book one particular department of administration—viz., that which deals with notification, hospital isolation and other distinctly

¹ According to the terms of the Chadwick Trust the subject might appear to have been limited to improvements in House Drainage, Sewerage and Sewage Disposal as affecting the Public Health.

medical preventive measures. It should be explained, therefore, that the writer has been familiar with these questions from the very beginning, having indeed from early student life onwards been associated with the most prominent originators of the Public Health service, and having been officially concerned at the very outset with the institution of the Notification and Hospital Isolation systems. He has in consequence seen how in practice the original idea of notification and the application of the hospital isolation system has gradually become modified,—so much so indeed, that it may not be going too far to say that the primary objects of their institution seem to have been lost sight of. Much good has been effected in past years by the system of hospital treatment of certain infectious diseases, but the “stamping out” idea, with which public authorities started some forty years ago, seems generally to have been forgotten, having for a long time now given place to a feeling of satisfaction when large numbers of cases are brought within the benefits of hospital treatment at the public expense. It is suitable, therefore, in this Preface, before considering each of the notifiable diseases that are dealt with upon this system, that something should be said as to the real test of the system. As the subject discussed in these pages is that of preventive measures, this test must obviously be the success obtained in the diminution and ultimate extinction of the diseases against which preventive measures are employed. In applying this test there is an initial difficulty. Owing to fluctuations, commonly called “epidemic waves,” it is impossible to draw conclusions from statistical comparisons of towns or districts, even when they are fairly near together. But objections of this kind lose in force if fairly long periods, such as those dealt with here, be taken for comparison. The writer has done this, and in endeavouring to gauge the measure of success or non-success attending our English methods during the past twenty years, he has taken each of the four diseases which are fully dealt with by our Public Health authorities. In each of these diseases improved, and still improving, medical sanitary organization, isolation and hospital administration have been found beneficial. He begins with that—viz., Scarlet Fever—in which the least con-

spicuous results have been produced, and ends with that—viz., Smallpox—in which the employment of preventive methods appears to have led to a veritable triumph.

To repeat—the popular estimate of the value of our English system does not at all agree with the views of its original promoters. The success of an isolation hospital is *not* the amount of “business” carried on there, but rather the usefulness of the institution, in the presence of infectious disease, in helping to control its spread and thus preventing its assuming epidemic proportions. It is hopeless to expect any real improvement so long as the Councils and Joint Hospital Boards entertain hazy and even wrong impressions as to the real intentions of the hospitals and institutions which they administer.

It will be evident from discussion of the experience of the four principal diseases, viz., scarlet fever, diphtheria, typhoid and smallpox, that our apparent want of complete success in carrying out the main intentions of the Notification Act has been due to failure in recognizing the importance of purely preventive measures. It will be seen throughout that it is the recognition of early cases and carriers of infection that must constitute the basis of a rational preventive system. The notification system as at present carried out is good so far as it goes, but it does not go by any means far enough, for it does not provide medical arrangements for the detection of early—the at present “missed”—cases of infectious disease; much less the premonitory symptoms of these diseases! These earliest symptoms are not by any means so easy to discover as is generally supposed. The fallacy of this supposition is indeed apparent from the evidence given before the Royal Commission on the Housing of the Working Classes in 1884 by no less a person than Sir Edwin Chadwick himself, who, great sanitarian though he was, could not be expected to appreciate the doctors’ difficulties. These are indeed in the early stages of infectious fevers often serious, and in any case obviously necessitate skilled medical knowledge in order to distinguish the nature of the illness at its commencement.

In the opinion of some authorities the missed and earlier cases are such an important factor in the spread of

infection that they alone are held to be sufficient to fully explain the apparent want of success of notification, isolation, disinfection, etc., in making a marked impression on the prevalence of scarlet fever and diphtheria. It is probable the proportion that "missed" bear to "recognized" cases is greater now than it was in the seventies or eighties, although the existence of "missed" cases in former times cannot be ignored. In the following pages there will be found good reasons for supporting this view. But even were the proportion the same there is an added reason for paying more attention to missed cases. We must never lose sight of the fact that increased facilities of locomotion have led to changed habits in our population. Aggregations of people are far more frequent in and near towns. The comparative seclusion of the village has ceased to exist, and the working of the Education Act brings together children who would not otherwise meet. All these influences tend in one direction, and that is in counteraction of the beneficial results of the present system of notification, etc. For, even if missed cases of scarlet fever and diphtheria do not exist in larger numbers now than when hospital isolation became general, their propagating power must have increased, seeing that the seeds of infection are more often scattered among susceptible children. To employ the "fire analogy," the sparks are more continuously falling where the fuel is most abundant. For this reason it is often contended that *but for the hospitals* prevalence of the above-mentioned diseases would have been much greater. From the ensuing pages it will be seen that, although it may be difficult to demonstrate, this assertion is most probably founded on fact.

It is plain that in the development of this branch of the Public Health service much more needs to be done in order to discover and deal with missed cases, and that for this purpose a great deal more medical observation and help will be required. It is equally obvious that, instead of such provision involving larger expense to the ratepayer, it should relieve him by lessening the number of cases requiring constant treatment at the isolation hospital at very great public expense.

Indeed, the most practical point bearing on the subject of this book is one that, though fully recognized by experts,

is hardly yet realized by the general public. We are all, however, fully conscious of the fact that there have of late years been rapidly growing demands on the public purse for various administrative purposes. As compared with some other Departments the amount allotted to Public Health, having regard to its relative importance, is surely moderate enough. But when we consider that, of the limited fund available for routine work, a large share is absorbed by the maintenance of isolation hospitals with their ever-increasing amount of "*business*," we cannot be surprised that the question has been asked by some prominent Medical Officers of Health—"Is it worth while isolating such a disease as scarlet fever—an illness which contributes to such a small extent to the death rate, and which in some counties adds its tens of thousands of pounds annually to the public expenditure?" Now the call for this expenditure is mainly owing to the primary object of notification and hospital isolation having been lost sight of. Instead of the disease becoming extinguished, hospitals have become more, instead of less, occupied in the lapse of succeeding quinquennia. Scarlet fever at the present day is often not such a serious disease as measles, yet each case is in some counties costing £10 a head for isolation. What this amounts to in the aggregate will be seen when we come to the discussion of this disease.

For the purpose of this Preface, and in order to emphasize the importance of this subject from the ratepayer's point of view, the writer would once more draw attention to the analogy of the preventive hospital service and that which is maintained by the public for fire extinction. To some an empty hospital would seem to be a sheer waste; but does not the fire station constantly kept in first-rate order for a long period have the same appearance of apparent uselessness? If what is contained in this book should have the effect of recalling attention to the primary objects of the whole system of dealing with epidemic infectious disease, the writer will be more than satisfied with the result of his efforts.

SIR EDWIN CHADWICK, K.C.B.

AN APPRECIATION

As this book is chiefly based on the Chadwick Medical Lectures delivered by the writer at the close of the year 1910, he desires to pay a tribute to the memory of a great man. Accordingly, before entering upon the discussion of a subject which concerns an already established and important branch of our administrative health service, it may be appropriate to take a brief survey of Sir Edwin Chadwick's life-work. This is most frequently referred to as that of the greatest sanitary reformer, but in this place it must be thought of rather as that of the practical administrator. The writer became personally known to Mr. Chadwick (still untitled as he then was and already quite an old man) in the year 1886. But for many years before, in fact since he can well remember, the personality and career of the great sanitary reformer had seemed familiar. Indeed, the earliest story relating to Mr. Chadwick that he calls to mind illustrated his extraordinary enthusiasm in the cause of municipal cleanliness, an enthusiasm which seems to have communicated itself even to the very youngest. At the present time, however, in writing of Sir Edwin, not so much as the inspirer of social and sanitary progress, but rather as the first sanitary administrator of modern times, we must look for a reliable and independent historical record. Fortunately this can readily be found, for there remain the words written more than twenty years ago by the late Sir John Simon, K.C.B. In his celebrated work on *English Sanitary Institutions*, published in 1889, Simon describes the rise and fall of the English General Board of Health. In connection therewith is to be found an estimate of the value of this very remarkable man Chadwick, by one who could

regard the part taken by an old colleague from a philosophical and impartial standpoint :—

“At the present date (1889), when thirty-five years have passed since the event referred to, it does not seem worth while to discuss more minutely the particulars of the quarrel in which the original Board of Health was brought so abruptly to an end; but of Mr. Chadwick, on this termination of his official career, something further may be said. In the common judgment of that time, it was he who had upset the coach. As the credit of having originated the Board of Health had been due to him, so to him was ascribed, with every depreciative term, the policy which had brought it to an end; and Mr. Chadwick bore in those days the distinction which has been many a great reformer's crown of laurel, that he was among the best-abused men of his time.”—*English Sanitary Institutions*, p. 231.

Then follows a full description of the qualities which are generally considered essential for successful administration. Simon seemed to think that Chadwick, though he had the supreme gift of being able to force public attention to the broad facts and consequences of a great public neglect, was deficient in respect of judicial patience, a virtue which is so essential to the achievement of “administrative success.”

“But,” continues Simon, “granted that he erred by impatience: but patience under sufferings of one's own, and patience towards the sufferings of others, are not equal measures of magnanimity. Mr. Chadwick, beyond any man of his time, knew what large fresh additions of human misery were accruing day by day under the then almost universal prevalence of sanitary neglect; and the indignation which he was entitled to feel at the spectacle of so much needless human suffering is a not ignoble excuse for such signs of over-eagerness as he may have shown. Another word, too, is emphatically due. . . . To those previous services of Mr. Chadwick's—to the ten years' arduous labour which he had given to the cause before the General Board of Health was called into being, we of this nation unquestionably

owe that our statesmen of those times were first awakened to the duty of caring for the Public Health, and that the first of our modern legislative endeavours were made to bring Health under the protection of Law."—*English Sanitary Institutions*, p. 253.

The writer was a former pupil and intimate associate of Sir John Simon. He saw a great deal of him for many years, especially at the time when he assisted him in reproducing his official publications for the Royal Sanitary Institute in 1887. He therefore knows well how vividly he (Simon) remembered Chadwick's unique relations to the beginnings of British sanitary reform; how permanently important in his opinion had been the momentum which the cause of State medicine received in those years from the vigour and substantial conclusiveness of his advocacy; and with what unfailing respect he was always thought of as first leader in so great a cause.

INFECTIOUS DISEASES

AND THEIR

PREVENTIVE TREATMENT

CHAPTER I

PRINCIPAL EPIDEMIC DISEASES

“ PRINCIPAL ” AND “ NOTIFIABLE ” DISEASES—VARIATIONS
IN INCIDENCE AND FATALITY—MORTALITY OF NOTIFI-
ABLE AND NON-NOTIFIABLE DISEASES.

As the subject of this book relates chiefly to Infectious diseases, especially those which prevail in epidemic form, it is desirable to explain what is meant by the different terms “ Principal ” and “ Notifiable ” Infectious diseases.

“ The principal epidemic diseases ” is a term which for many years has been used by the Registrar General to denominate a group of diseases which contribute materially, though in frequently varying proportions, to the total death-rate of the kingdom. The diseases are seven in number, their names being as follows :—(1) ¹ *enteric (typhoid) fever*; (2) ¹ *smallpox*; (3) *measles*; (4) ¹ *scarlet fever*; (5) *whooping-cough*; (6) ¹ *diphtheria*; (7) *epidemic diarrhœa*.

Some confusion has occasionally arisen between the group officially denominated by the term “ principal epidemic diseases,” and that other group of epidemic diseases which were made compulsorily “ notifiable ” by the “ Notification of Infectious Diseases Act, 1889.”

¹ Notifiable diseases.

*Distinction between "Principal" and "Notifiable"
Epidemic Diseases.*

The last-named list includes only four of "the seven" principal epidemic diseases, viz., Nos. (1) enteric fever, more commonly known as "typhoid," (2) smallpox, (4) scarlet fever, (6) diphtheria. It will be seen that it does *not* include measles, whooping-cough or epidemic diarrhoea, the illness which is so terribly fatal to young children in hot dry summers. It will further be seen that in both lists there is a conspicuous omission, viz., influenza, which twenty years ago added so seriously to our death-roll and from which the country has never since been free.

Now that so much more attention is being given to the subject of "preventive" or "State" medicine, as it is sometimes called, it can hardly be wondered that the composition of the differently denominated groups should give rise to question, the more especially when the proportion in which these several diseases contribute to the total mortality comes to be examined. One of the best ways of doing this is by means of columns placed side by side as is done by Dr. Newsholme in his classical work on the *Prevention of Consumption*. Another method of demonstrating these very important facts is that adopted by the Superintendent of National Vital Statistics (Dr. T. H. C. Stevenson) in the last-published Blue Book of the Registrar General, with whose permission the following diagram, with portion of the *Seventy-Second Annual Report*, pp. 55 and 56, is here reproduced.

"The proportions in which the more prevalent diseases contribute to the death-roll are shown by the clock-shaped diagram in which the whole area of the circle represents deaths from all causes, and the various segments deaths from particular causes or groups of

causes. It will be noted that a large proportion of the whole number of deaths is attributed to a few of the more important diseases, especially tuberculosis,

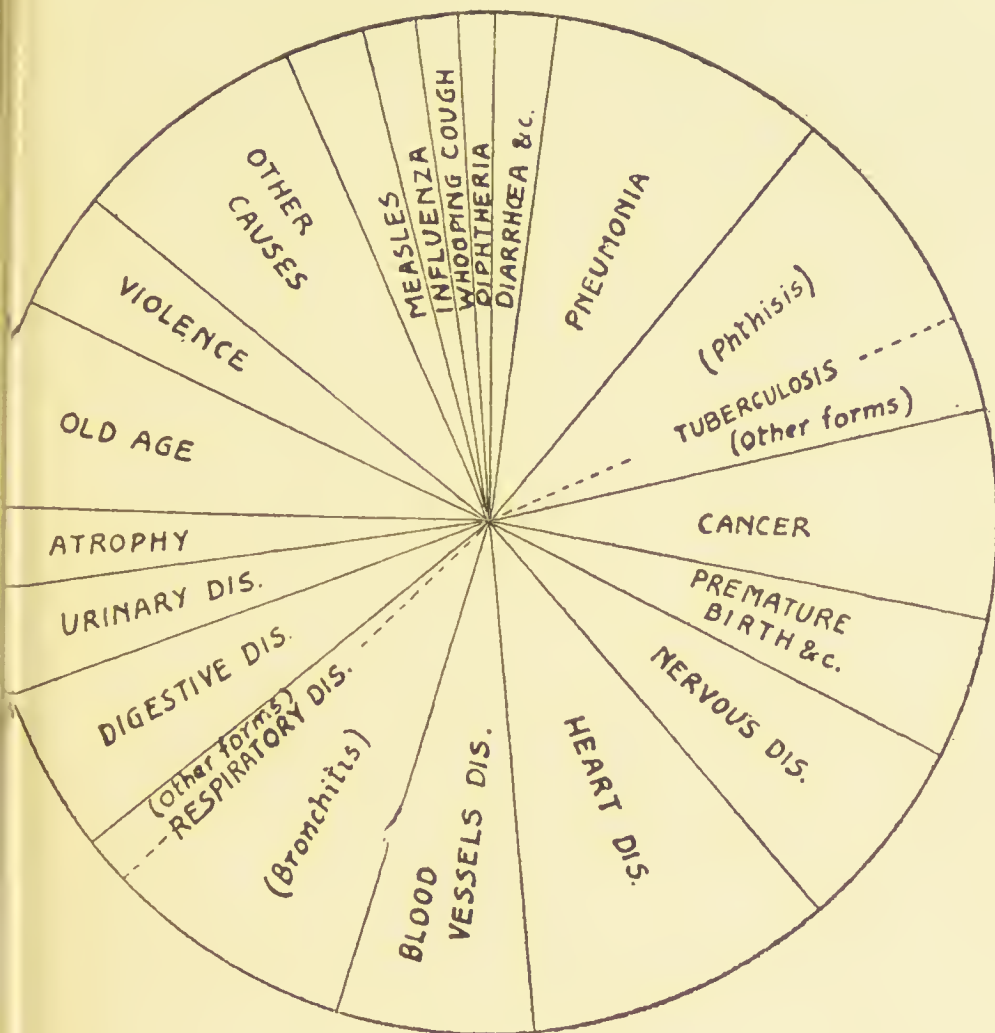


DIAGRAM A.

Showing the Proportions of Deaths from the Principal Causes to Total Deaths in England and Wales in the year 1909.

pneumonia, bronchitis and cancer, which together contribute more than one-third of the total mortality.”

In this diagram only four of the seven principal epidemic diseases are shown by separate segments, viz., measles,

whooping-cough, diphtheria and diarrhoea. To these is added influenza, which—it has already been remarked—is *not* included in the usual list of the Registrar General's seven principal epidemic diseases. The deaths from these diseases estimated respectively in proportion of deaths from all causes and according to rates per 1,000 persons living, given in order of fatality, are as follows :—

	Proportion per 1,000 deaths from all causes.	Death-rate per 1,000 living.
¹ Measles	24·4	0·35
¹ Diarrhoea	19·9	0·29
² Influenza	17·4	0·25
¹ Whooping-cough	13·9	0·20
³ Diphtheria	10·1	0·15

The proportions of deaths here recorded are for one year only, viz., 1909, in which the death-rate from all causes was lower than in any previous year, viz., only 14·49. But the diagram serves to illustrate the point we are now considering, viz., the relative mortality from the seven principal epidemic diseases as distinguished from those which are notifiable. For it will be seen that the four out of the seven included diseases comprise only one (viz., diphtheria) which is notifiable. Three, viz., measles, diarrhoea, and whooping-cough, are unnotifiable, or in the case of measles only notifiable by special provision of the Local Government Board on the application of sanitary authorities. On the other hand, the three diseases, typhoid, smallpox and scarlet fever, which are included in both the Registrar General's and the Notification lists, are not shown on the diagram. The reason for the omission is obvious. It is that the amount of mortality these three more or less preventable illnesses gave rise to in 1909 was not sufficiently considerable to need separate representation. They are therefore left out to be absorbed in the segment allotted to "Other Causes." This is a very

¹ Not notifiable but included in the Registrar General's list.

² Neither notifiable nor included in the Registrar General's list.

³ Both notifiable and included in the Registrar General's list.

significant fact which we must presently consider in all its bearings; but before leaving the part of our subject now under discussion, it may be well to revert to an expression used at the outset of this chapter, which describes a characteristic of all epidemic diseases, viz., their changes in varying proportions in both prevalence and fatality.

Variations in Epidemic Disease Incidence and Fatality.

This most interesting part of our subject will be to some extent discussed later on in the chapters on scarlet fever. Ancient works on medicine contain the observations, experience and conclusions of the wisest of physicians in all known times. The records of modern medical history are still more full and instructive. It is during the last sixty years, which has included a period of unprecedented activity in sanitary and social advancement, that, coincident with that advancement, there has gradually opened up a field of research called epidemiology, which is akin to pathology in its deep and scientific meaning, especially in relation to the problems which now-a-days so constantly call for some kind of solution by statesmen and administrative officials generally. It has fortunately from the very first been the subject of devoted service on the part of those who, attracted by the importance of such researches, were, from their position, scientific attainments and powers of reasoning, enabled to enlighten us all in matters wherewith we are concerned as practical advisers.¹

¹ The Epidemiological Society for the investigation of epidemic diseases was instituted on July 30, 1851, at a meeting held at the Hanover Square Rooms under the presidency of Lord Ashley (afterwards the Earl of Shaftesbury). At the first Session of the Society, reference to which was made in the earliest volume of *Transactions*, it was indeed well said by Dr. Babington, the President, in his opening address that—"The Peace of Europe, which it is to be wished no national jealousies may disturb, is very favourable to the interchange of scientific information among medical men of different countries; and the facilities of communication which the powers of steam have created, enable us to carry on almost simultaneously

Although we stand in a very different position to that of half a century ago with regard to diseases which have now for many years been spoken of as "more or less preventable," there is still much to be explained as to the true causes of the varying prevalence of those diseases which contribute materially to the mortality. Diagram A. affords immediate illustration of this by the sub-segments of different size representing the respective shares taken by *measles*, influenza, *whooping-cough*, diphtheria, and *diarrhæa* in the production of the total mortality of 1909. It is a matter of common knowledge that, within the twenty years, 1890 to 1909, comparing one year with another, the incidence and fatality of these five diseases have differed in a remarkable way.

Dr. Stevenson (p. 57 of the Registrar General's *Report*) reminds us that measles, which is so often associated with pneumonia in the wintry months of our climate, caused increased mortality in the year 1909. On the other hand, influenza, which also contributes to the pneumonia section, though giving rise to a considerable mortality, is a very different disease now to that which, after a long absence, laid hold of the population some twenty years ago, exhibiting then, at the beginning of the nineties, an infectiousness and lethal character which are still well remembered.

Whooping-cough had the lowest death-rate on record. It was not more than 201 per million at all ages, the nearest approach to this figure having been 241 in 1906.

The year under particular notice was also signalized

observations at different places remotely distant from each other. There probably never was a period in the world's history when human knowledge was so advanced in all its branches as at the present time." May not the same remarks be made now? If the names of those who have laboured in this field of scientific discovery were given, the list would be found to contain some of the most eminent men in the medical profession, whether official or non-official, whether physicians, surgeons, pathologists, or other men celebrated in research of various kinds, whose work creates a desire to discover the natural laws which govern epidemic prevalence.

by a low death-rate from diphtheria, the probable and possible causes of which will be discussed in the chapter devoted to the subject of this preventable disease.

Lastly, we have in epidemic diarrhœa, the "Cholera infantum," a disease which must always be reckoned to make a difference in the mortality of the third quarter of the year, hot dry years being by far the worst, and the months of August and September being those in which the disease in this country generally appears in epidemic form and is particularly fatal to young infants. In fact, with regard to this recurring plague it may be said that, given the monthly meteorological charts for towns or districts with average birth-rates during the past thirty or forty years, there would be no difficulty, without any reference to death statistics, in picking out those in which the diarrhœa death-rate had sprung up suddenly and subsided as suddenly within the critical period, which seldom exceeds eight or ten weeks. During that short period the average weekly death-rate may be actually doubled. In such a year a very marked difference in the total infant mortality takes place, and the general death-rate is as notably affected as it would have been in former years by Asiatic cholera, the plague or smallpox.

*The Share in the Death-rate caused respectively by
Notifiable and Non-notifiable Diseases.*

Enough has been said to show that the sub-segments of Dr. Stevenson's "Clock-shaped" diagram are liable to considerable variations, and that in consequence the whole epidemic segment may vary in size when the statistics of one year in a given period of death registration come to be compared with those of another. As the present diagram stands, the proportion that the epidemic section bears to the phthisis and tuberculosis section is as 1.0 to 1.16. They are generally referred to as about equal; that is to say, the deaths from tuberculosis, including

phthisis (consumption), are often as numerous in a town or district as are those from all the diseases of the epidemic class put together. But epidemic diseases are, as we have seen, specially liable to fluctuations in prevalence and fatality, and consequently their total deaths, instead of being less, as shown on this occasion, may sometimes be equal to or even a good deal more than those from tuberculosis and phthisis. The statistics of the epidemic section in 1909 amount to 1·24, but this figure does not include deaths from three epidemic diseases which, being notifiable, are naturally thought of as being most important. The question may be asked, therefore, had there been sub-segments for smallpox, typhoid and scarlet fever, would they together have made any notable difference in the size of the whole segment ?

If we take smallpox statistics for the last quarter of a century, including the epidemic periods of 1893 and 1901-3, the answer would certainly be in the negative, as there have been so many years in which the country generally has been free from this disease. This, however, is very far from saying that an epidemic of the 1871-2 type might not under conceivable conditions work terrible destruction in this country.

If we take typhoid, we have a disease which has been continuously and greatly reduced, as has been shown graphically by Dr. Herbert Timbrell Bulstrode, by the maps he prepared for the Local Government Board for all the counties in England and Wales, from a height of 400 per million, or 0·4 per 1,000, living in 1875 to 90 per million, or 0·09 per 1,000, living thirty years later.¹ For the year

¹ Dr. Herbert Timbrell Bulstrode, the author of these maps (which were exhibited at the Chadwick Lectures), had signified a desire to assist the writer in bringing them up to date; and they would have appeared as an Appendix to this Volume, but for a sad and unexpected occurrence. On July 21st, 1911, he (Dr. Bulstrode) one of the most distinguished members of the Government Medical Department, died quite suddenly from heart failure. The proof sheets of this book were at that time passing through the press. The numerous references to the late Dr. Bulstrode are therefore left standing.

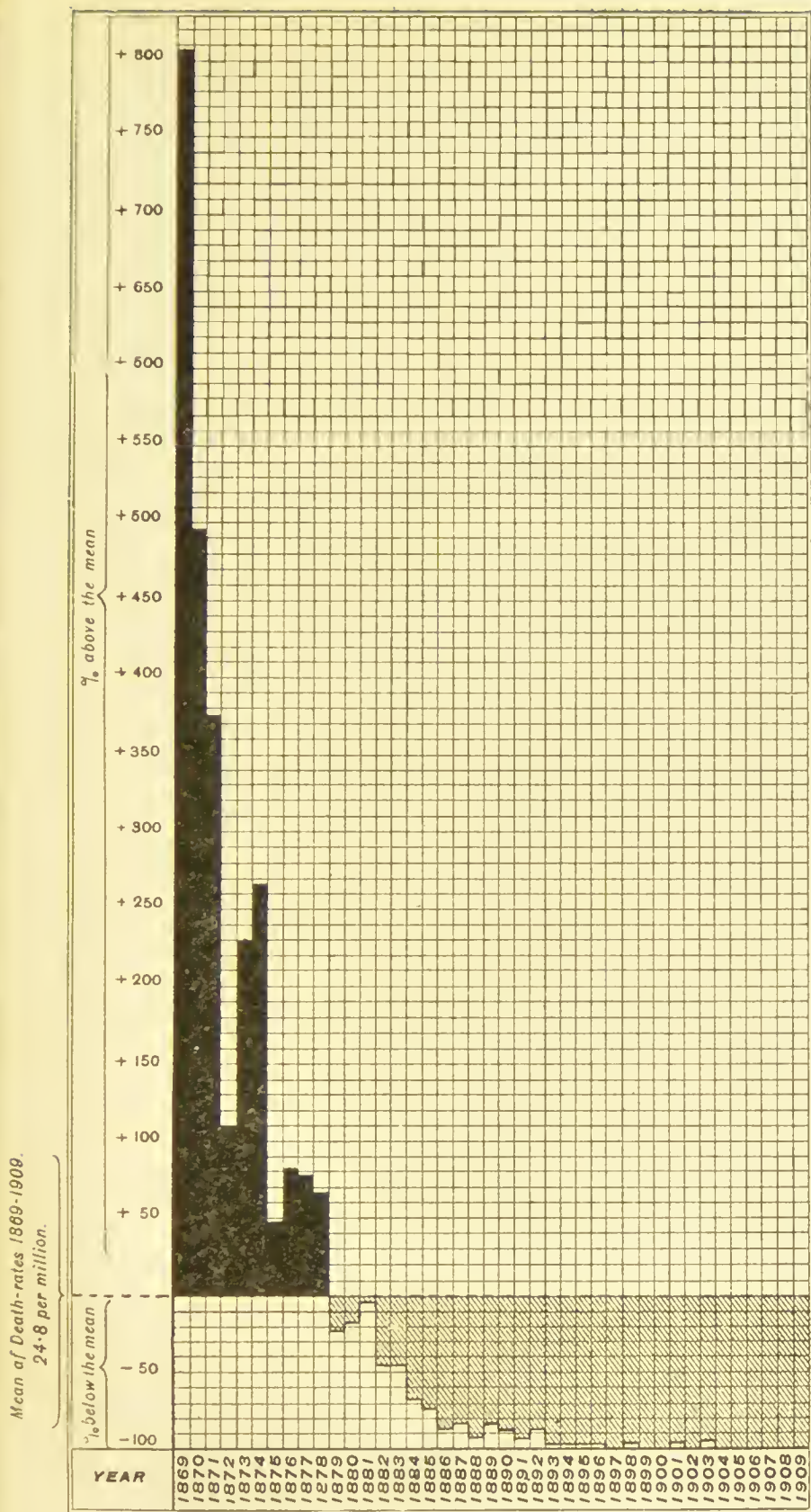


DIAGRAM B.

From the London Series. Shows the Extinction of Typhus Fever.

under notice, 1909, it stood at 0·06 per 1,000. Of this disease it may be safely said, having regard to all the preventive measures already carried out and those still in progress, it is not at all likely that (whatever may happen in certain towns or counties in the way of local outbursts) the epidemic segment would be materially augmented by typhoid.

The same is probably true with regard to scarlet fever, the death-rate of which is now down to 0·1 per 1000 living, though in speaking of this disease we must not lose sight of the fact that in past generations this is a form of epidemic disease which has shown itself changeable in type. Indeed, though we have every reason to be hopeful as to the mitigating influence of the vast improvements in sanitary and social conditions brought about by the arduous labours of county, city and district councils, and, generally speaking, by authorities acting under the Local Government Boards, and though we may probably regard typhus, for example, as practically extinct after so many years, our comfortable convictions are liable to be upset by the sudden advent of such a terrible disease as influenza has proved itself to be in modern times. We must also not omit to mention that occasionally local outbreaks of scarlet fever are of a virulent type.

But to return to our point—by ordinary calculation we should arrive at the conclusion that typhoid fever and scarlet fever together are not likely in any year to give rise to a death-rate much exceeding 0·2 per 1,000 living, a rate which is less than the ordinary annual death-rate from whooping-cough.

This preliminary discussion brings us to the consideration of these apparently arbitrary distinctions between notifiable and non-notifiable diseases. As this subject involves some explanation of the past, present and probable future scope of preventive medicine and the bearing of medical sanitary organization thereon, it must be reserved for separate chapters.

CHAPTER II

SCOPE OF PREVENTIVE MEDICINE

CONSTRUCTIONAL AND PERSONAL HYGIENE—GOVERNMENT INSURANCE BILL—PREVENTION AND TREATMENT OF DISEASE—NOTIFICATION OF MEASLES—WHOOPING-COUGH—OTHER NOTIFIABLE DISEASES—NON-INFECTIOUS NOTIFIABLE DISEASES.

It will have been gathered from the contents of the preceding chapter that the reasons for selecting for notification particular kinds of epidemic infectious diseases are related not wholly or even chiefly to their prevalence or morbidity. For example, not so many years ago influenza of a very spreading and severe type prevailed in these islands, and, though now milder in character, it has not yet left the shores of Great Britain. It has been often asked—Why should influenza be unnotified when cases of smallpox, which are comparatively rare, receive a vast amount of public attention? The answer in a few words is that these two diseases stand, as it were, at the opposite poles when we regard them from the point of view of preventability. That is to say, that considered from the practical medical standpoint, to the last mentioned, viz., *smallpox*, there is given every possible advantage to be derived from the two chief factors in prevention where isolation is mainly concerned. These two factors are—(1) long incubation period (peculiarly favourable to success in isolation) and (2) control by vacci-

nation. With *influenza* we have unfortunately the exactly opposite conditions, *i. e.*, extremely short incubation period and utter absence of any means by which the population generally, or even those in immediate contact with infection, could be rendered immune to attack. In this chapter, it falls to us to consider the conditions that in the past have led to the formation of so narrow a circle of notifiable and presumably preventable diseases. But before proceeding thus far a word should be said as to the title of this chapter.

Constructional and Personal Hygiene.

The term "Preventive Medicine" might be taken in a very much more comprehensive and ambitious sense than is contemplated in this modest volume.¹

"Preventive Medicine," when written about in the early and mid-Victorian era, seemed to be a subject for medical or scientific essayists who, dealing with it in the absence of any actual knowledge either of local government or the social and sanitary circumstances of the masses of the people, were apt to indulge in something like day-dreams. Their contributions were, in fact, regarded by statesmen and officials in that light, and though we are bound to refer to their well-meant efforts with profound respect, it cannot be said that the advice they tendered was marked either by practicality at the time, or that it even represented a counsel of perfection which might be attained in the course of many years. To-day it is far otherwise. Local health boards or councils, originating

¹ See *The Practitioner*, Queen Victoria's Diamond Jubilee Special Commemoration Number, June 1897, article on "The Achievements of Public Preventive Medicine in the Victorian Era" by the writer of this book.

See also the *most important* "Address on the Nation and the Tropics," by Sir William Osler, Bart., M.D., F.R.S., Regius Professor of Medicine, Oxford. Given at the London School of Tropical Medicine, October 26th, 1909. Issued by the Research Defence Society.

as they generally did from corporate bodies and Poor Law authorities, are now forty years old, some of them indeed still older by ten or twenty years. "Communal hygiene," which includes hospital provision of various kinds, a very essential part of a preventive system, is in a fairly advanced state, and the establishment of the dispensary system on modern lines is showing signs of development. Moreover, since the Boer war, when attention became riveted on the inferior physical condition of our adult population, now principally town-bred, the urgent need for attention to "individual" as well as "communal" hygiene has been insistently forced on the attention of the public. Indeed, it is not too much to say that in respect of individual hygiene, including as it does the care of infants and the physical condition of children, more has been done to advance the purely medical part of public health work during the last decade than in the twenty years that preceded it. It is true that this could not have been achieved until other essential work had been accomplished. But now that English sanitation, in the promotion of which the medical profession has taken an honourable and prominent part, is so well on the way to completion, the time and attention of our authorities and of voluntary associations of women as well as men are being freely spent with an extraordinary amount of devotion and public spirit. The Midwives Act as well as the Education Act have already created a change which could hardly have been anticipated if we only go back to the end of the Victorian era. Indeed, when we contemplate these advancements, first in the fundamental work of constructional hygiene, and then in the more personal element of public hygiene as affected by State legislation and general improvement, we realize with satisfaction that the basis of a sound system of preventive medicine is in a fair way to being established in England.

The Government Insurance Bill.

The Government Insurance Bill, which is just now under consideration, is likely to affect the whole relation of the medical profession to the people. Here let us observe that while it may be desirable or even necessary for some alteration to take place for reasons of public policy, it would surely not be high statesmanship to effect this without a full understanding of the many medical considerations involved in recent proposals. It was not the object of the lectures on which this volume is based to discuss preventive medicine from such a widely important and deeply significant point of view, but it may be opportune to recall some of the comments of Simon on Chadwick's administration, which are not included in the appreciation given above. Chadwick was, of course, no more than an administrative official, but he was one to whom in those days it was, in consideration of his exceptional position, thought proper to give a comparatively free hand. It is impossible not to see points of resemblance in the situation then and now. For the case which had then arisen was "one in which *deliberate* national consents had to be obtained, and in which, therefore, no real, no permanent, success could be won, except in the proportion as the people and their representative bodies should have made way in a necessarily gradual process of education. He (Chadwick) could not advisedly have thought it possible to snatch his verdict and to revolutionize national habits by surprise."¹

The medical profession is great not by its wealth, distinctions or direct political influence, but chiefly by its sacred traditions in relation to the sick and suffering and by the intimate way in which the doctor in his work becomes associated with the most private life of almost everybody at some time or another. It is impossible to

¹ *English Sanitary Institutions*, p. 232.

think of a scheme of preventive medicine promising permanent success in which the deliberate consent of a great representative body, such as the medical profession in all its branches undoubtedly is, is not absolutely essential for working purposes. It remains to be seen whether this principle is recognized in the amended Bill should it become law.

But acutely interesting as this subject is at this critical moment of sanitary and social history, we must revert now to what concerns us immediately in the preventive treatment of notifiable, partly notifiable and occasionally notifiable disease. Let us then, in the first place, agree on what it is intended to convey by the expression of preventive treatment from a public health point of view.

The Prevention and Treatment of Disease.

It is well known that both at home and abroad the work of prevention and treatment carried out under public authorities and at the public cost, especially in diseases occurring amongst the very poor, have been almost inseparably associated, though the preventive side of the work has not been nearly so much developed as it might possibly have been. At times of pestilence, war and famine, prevention often takes the form of treatment. For example, in the time of the cholera epidemic of 1866, to go back no further, cases, as the writer knows from his student experience, were taken from the dens and hovels of St. Giles's, and other densely crowded districts of London, to be skilfully treated in temporary structures in open places. The cutting short of illness and real saving of life of those actually attacked by such deadly diseases as the Asiatic cholera and spotted typhus formed the prime object of removal. The method of causation of devastating epidemics was only beginning to be understood when the Diseases Prevention

Act became law. The *treatment* of the sick was at that time even more the primary intention of public help than was the removal of sources and channels of infection. The existence of the old London Smallpox and Vaccination Hospital is another example of what may be distinctly described as preventive treatment. For not only were the unvaccinated rendered immune to smallpox within the precincts of the establishment, but persons actually infected with smallpox were successfully treated there by vaccination. These instances are given to show that though the intentions of an isolation hospital are, as will be presently seen, essentially different to those of hospitals which exist mainly for the purposes of cure, and while the treatment of patients at isolation hospitals or sanatoria needs, of course, to be directed to the doctor's principal aim, viz., the cure of the patient, it often incidentally leads to other advantages. Thus by cutting short the period of infectivity of patients and by preventing convalescents becoming carriers of infection, the closely allied functions of medicine—preventive and curative—are both operating beneficently.

In recent years the indissoluble connection between prevention and treatment of illness which justifies the use of the expression "Preventive Treatment" is more or less shown in the case of all the notifiable diseases which are sent to isolation hospitals—(1) in scarlet fever, probably by hygienic surroundings and the mitigation of disease type ensuing therefrom; (2) in diphtheria, by the arrest of the disease in its progress and its cure by antitoxin; (3) in typhoid, by medical knowledge, nursing skill, and, especially, by the inculcation of disinfection rules necessary to prevent the spread of infection.

In measles and the other diseases (much less serious than measles) that occasionally find their way to isolation hospitals there is similar relationship between prevention

and treatment. In fact, if measles comes to be generally notifiable and hospital-treated it will be for the reason that such a practice will not only assist in limiting to some extent the spread of the disease, but also, by removal of cases, especially those likely to be severe in character, to the hygienic atmosphere of a hospital, materially lessen the mortality among them. In other words, the type of the disease may reasonably be expected to gradually change for the better, with the result that the death-rate would be reduced much in the same way as with scarlet fever.

*The Notification of Measles.*¹

When the notification schemes first came into operation the general public were interested to know why measles was *not* included. The answer given in all good faith was that, unlike scarlet fever, it could hardly be expected that measures of even the promptest kind could be effectual in preventing the spread of measles, inasmuch as during a period extending to four or five days before the distinctive rash appeared and made the notification warrantable, the illness was then already in an acutely infectious stage. It is obvious that much mischief may arise from undeclared cases, and it is therefore hardly surprising that the different nature of the two infectious diseases—scarlet fever and measles—afforded apparently good reason for preferring that in which it was expected that the public benefits of isolation would be the greatest. But the circumstances of twenty or thirty years ago have considerably changed. In the first place, the scarlet fever of the present day is a very much less formidable disease than that which some of us can remember, so that if the case mortality were compared with that of measles the difference would probably not prove to be markedly, if indeed at all, in favour of the latter. Again, it has

¹ For rate of mortality from Measles, see Diagram C, p. 20.

been discovered, as will be shown in the chapter on scarlet fever, that under arrangements hitherto existing a great deal of mischief *has* accrued in the spread of infection *before* notification with scarlet fever as well as measles. So that distinctions which were supposed to place the two kinds of illness in separate categories as regards preventive treatment are not so real as was imagined. Then again the medical inspection of school children is now fairly in operation, and notification seems likely to be specially useful in furnishing a history of a family as regards previous attacks of illness which affect the question of susceptibility to a seldom recurring disease. It is plain that the acquirement of such information is of immediate importance in regulating school attendance so as to control epidemic spread. For these reasons, and because we are gradually acquiring a wider conception of the advantages of preventive treatment, which has been, and is likely by the Insurance Bill to be still further, applied to that extensively prevalent cause of disabling illness, viz., tuberculosis, there is a general disposition to enlarge the scope of this department of preventive medicine. It may be safely said that by general consensus of opinion among experts this extension might at once take place so as to permanently include measles in the usual official list of compulsorily notifiable diseases. There is, however, one proviso to be made, and that is that the authority applying for notification powers should be in a position to show that it is prepared to make suitable use of information which cannot be obtained without appreciable expenditure. The writer could mention instances where the amount paid in the usual fees for notifications has in ten years amounted to a sum such as would have provided means of some substantial and much-needed improvement in the working staff of the district health department. In these very same districts little or nothing seems to have

directly resulted from the adoption of the system except the mere tabulation of the certificates.¹

Whooping-cough and some other Causes of Early Infant Mortality.

As regards whooping-cough, which, unfortunately, like epidemic diarrhoea, seriously adds to the perils of early infant life, it is advisable to keep babies as far as possible out of the range of infection, especially during the seasonal period of fatality, viz., December to May. And even if this does seem at present a counsel of perfection mostly unattainable under present housing conditions, it is nevertheless a practical recommendation to be borne in mind by those who are devoting themselves to the cause of infant hygiene.²

The Midwives Act may indirectly lead to the notification of other specific diseases in which medical advice and caution may, even so far as it can go at present, prove of great practical value. In all matters relating to infant hygiene, it cannot be too strongly insisted that medical knowledge and experience are indispensable if preventive treatment is to make sound progress.³

Other Notifiable Infectious Diseases.

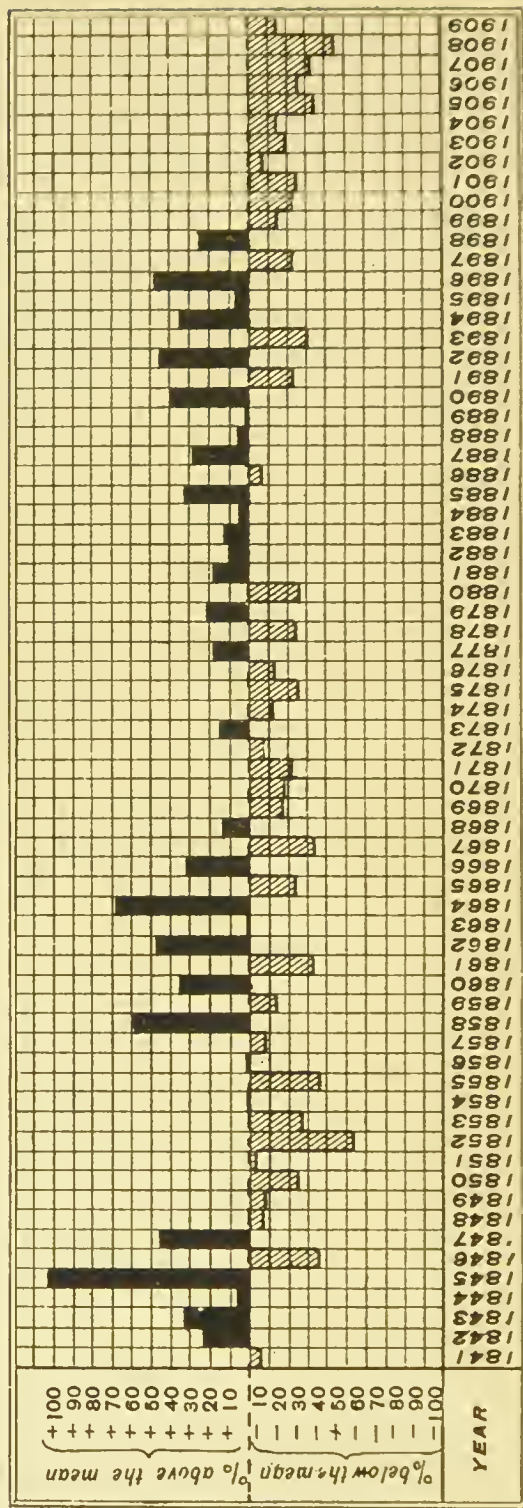
There remains little now to be said on the subject of the occasionally or specially notifiable (though rarely) hospital-treated diseases, for tuberculosis, mainly on

¹ The same remarks will be found to apply very generally in the case of erysipelas, which has now for a long time been generally notifiable by Statute. The reasons for its original inclusion have never been fully explained. The expense of notification might very well be saved for other preventive purposes.

² See reference to Whooping-cough given in Memorandum by Dr. Chalmers of Glasgow, which appears in Chapter IX of this book.

³ Dr. Crocker, Medical Officer of Health for Richmond, Surrey, has written both forcibly and well on this subject. His wide experience in general practice as well as in public health work entitle his views to consideration.

DIAGRAM C.
From the London Series. Showing the Mortality and Epidemic Fluctuations of Measles during Seventy Years.



account of economic considerations, needs to be discussed in a separate chapter. The comparatively slight diseases, chicken-pox and mumps, are now referred to. They are chiefly significant from a school inspection point of view, as they may necessitate school closure. Chicken-pox, when smallpox is about, involves difficult questions of diagnosis which may at any time become both troublesome and important. Indeed, occasionally the distinction between chicken-pox and modified smallpox is one of the most responsible duties that may fall to the lot of a medical officer of health or a school medical officer. In the course of preventive treatment cases have been admitted to ordinary isolation hospitals, but in that way the risk of "cross infection"—one of the chief drawbacks of hospital isolation—is inevitably increased.¹ In this place it is only necessary to refer in passing to the improvement of our preventive treatment of infectious diseases by the introduction of additional safeguards against cross infection. These are the barrier system (Biernacki), the cubicle system (Caiger) and the cell system (Goodall). The last-named system was initiated at the Pasteur Institute in Paris. Examples of it may be seen at Homerton, E., at Beddington (Croydon R.D.) and at Tolworth (Surbiton U.D.), both near London, besides many other places.

Lastly, in connection with epidemic infectious diseases we may briefly notice one, viz., cerebro-spinal fever, which has long been of interest to pathologists and epidemiologists on account of the question of its infectiousness, and its possible relationship to typhus. An epidemic which occurred in North Germany was investigated by the late Sir John Burdon Sanderson, Bart., F.R.S., for the Medical Department of the Government in 1865. An

¹ The notification of chicken-pox was urged by some authorities, in 1901-2, for independent reasons connected with the interesting question then being asked, viz., "What *bridges-over* the intervals between smallpox epidemics?"

account of an inquiry in those places about the Lower Vistula, where the disease prevailed, appears in vol. 2 of the *Reports*, pp. 253-262, of the late Sir John Simon, K.C.B., F.R.S., edited by the writer for the Royal Sanitary Institute in 1887. From time to time there have been alarms as to the possibility of the disease becoming epidemic in this country. But happily, though considerable outbreaks have occurred in recent years, as, for instance, at Glasgow, it has rarely assumed epidemic form for a long time. The writer saw cases with Dr. Leonard Dudgeon of St. Thomas's Hospital as recently as in 1907. It may be noted that they bore removal well, and were suitable, therefore, for hospital isolation treatment, but in this disease it is the sanitation of the house and attention to the surroundings of the patient that are most essentially important.

The following is an account taken from the *British Medical Journal*, March 9, 1907, of a meeting convened by the writer as county medical officer of health about that time:—

“ Dr. Franklin Parsons of the Local Government Board gave an excellent review of existing knowledge of the subject, and of Dr. M. H. Gordon's report to the Local Government Board. He especially dwelt on the difficulty of identification of the meningococcus, and outlined the etiology of the disease, explaining how, so far as our knowledge went, its infectivity and the limitations thereof might be accounted for. He concluded by referring to the low resistance of the coccus—as proved by laboratory experiments—to the destructive effects of light and air, thus drawing attention to the striking analogy afforded by experience between typhus and cerebro-spinal fever in respect of their causation. Dr. Seaton informed the meeting that a week before he had the honour of a call from

Dr. Horace Jeaffreson, who, as the resident medical officer of the London Fever Hospital, 'at the beginning of the sixties and after,' had probably seen more of the two above-mentioned diseases than any other living authority in this country. In those days, Dr. Jeaffreson said, typhus was commonly called 'spotted fever,' and the term was not applied to 'epidemic cerebro-spinal meningitis.' *In the early sixties epidemics of the two diseases were concurrent, but their clinical manifestations were markedly distinct.*"

Non-infectious Notifiable Diseases.

Some years ago, shortly after the appointment of a distinguished medical officer of health—Dr. (now Sir) Arthur Whitelegge, K.C.B., as the chief of the Factory Inspection Department of the Home Office, an innovation took place which may be said to have marked a departure from the principle on which the notification of disease was first made compulsory. With the introduction of this kind of statutory notification, whereby not only cases of anthrax infection, but cases of phosphorus, lead and arsenic poisoning, were required to be notified to his Majesty's Chief Inspector of Factories at the Home Office, there took place a very important forward step in the development of preventive treatment. For, by means of inquiries and action taken in consequence to secure the adoption of approved measures of precaution on behalf of those employed in dangerous trades, such as those of match-making, file cutting, pigment grinding and the like, the health of the individual man or woman came under the protection of law, so far as factories and workshops were concerned. How far may this principle be likely to become extended? Some years ago letters appeared in

the public Press on this subject.¹ It is important to note that the reports of the present Medical Officer of the Local Government Board contain accounts of inquiries now on foot, which seem to forecast some further developments in the scope of preventive medicine, which, before long, may become a work of vast importance. We must, however, confine ourselves at present to consideration of the notifiable and hospital-treated diseases, one of which—tuberculosis—is assuming immediate practical importance in view of forthcoming legislation.

¹ See letters in *The Times*, August 1893, on Lead Poisoning and the Notification of Consumption.

CHAPTER III

PHTHISIS

OFFICIAL REPORTS ON NOTIFICATION AND PREVENTIVE MEASURES—THE FACTORS IN PHTHISIS (CONSUMPTION) REDUCTION—SANATORIUM OR HOSPITAL ACCOMMODATION—SOME NECESSARY CONSIDERATIONS.

“CONSUMPTION,” to use the name by which the most widely prevalent form of tuberculosis is commonly known, is not generally or compulsorily notifiable in England; although it must be stated that many changes in regard to systematic notification of this disease have been made, and are still being made, both in this country and in Scotland. The inclusion of diseases as notifiable in the lists scheduled under statutory provision is, as we have already seen, confined to diseases of an acute or transient nature. It is comparatively easy to protect the interest of the sufferer in this class of case. At the most, two or three months generally sees the end of an illness, and the loss or inconvenience that may result therefrom before convalescence and disinfection are complete. But when we have to deal with tuberculosis, an hereditary and, maybe, life-long cause of more or less disabling illness, it is obvious that serious individual hardships may arise from notification. It is apparent, therefore, that much has to be considered before the system could be generally agreed to. The same is true with regard to the provision of sanatorium or hospital accommodation, the scale on

which it should be furnished and the principles which should govern its use.¹ A great deal has been written on these subjects of late years, but there are two works which stand out pre-eminently in the mass of literature that has appeared since the late Professor Robert Koch of Berlin discovered the tubercle bacillus, now just about thirty years ago. These works respectively, taken in the order of their publication, are those by Dr. Herbert Timbrell Bulstrode and by Dr. Arthur Newsholme, the present Chief Medical Officer of the Local Government Board, who compiled the materials of his book when still Medical Officer of Health for Brighton. These books were in no sense rival publications; on the contrary, each of them must be considered as complementary to the other. They are both standard works that every one concerned in the direction of Public Health administration should have on his shelves.

Report on Sanatoria for Consumption.

Dr. Bulstrode's report *On Sanatoria for Consumption, and certain other Aspects of the Tuberculosis Question* is a large volume of 660 pages. As regards information on all aspects of the question, it is a veritable mine of wealth. It contains abundant particulars not only as to sanatoria, and the various trial notification systems, but especially concerning the German compulsory insurance system as a factor in the control of phthisis. The introductory chapter is the most important, for the reason that it sets out in a clear and logical manner the main considerations which should guide us in our choice of methods of prevention, so that, on the one hand, while securing sensible improvements and the adoption of

¹ It is plain that if the part of the National Insurance Bill which deals with Sanatoria should become operative these questions will be affected.

sound methods tending to the better control of phthisis prevalence; on the other hand, the public should be fully and properly informed and assured, and exaggerated ideas of the intensity of phthisis infection dispelled. To this end Dr. Bulstrode wisely quotes the sayings of some of the leading physicians of the day. The report, which took several years to complete, was ordered in 1902 by the former President of the Board, the Right Hon. Walter Long, M.P. In presenting it to the Right Hon. John Burns, M.P., five or six years later, the Chief Medical Officer of the time—Sir William Power, K.C.B., F.R.S.—wrote a preface which is of itself not only a measure of the importance of the report; but is also, coming as it does from such an eminent authority, a peculiarly enlightening document. In order to appreciate this fact, it should be explained to the reader that, as a young man in the sixties, Mr. Power was himself in charge for some five years, as Resident Medical Officer, of the far-famed Chest and Consumption Hospital at Victoria Park, London, E. The consulting staff of that great benevolent institution included some of the best-known physicians of the day. The writer is cognizant that they one and all had the highest opinion of the Resident Medical Officer, not only for his acumen in diagnosis, but for his insight and understanding of the proclivities and deeper problems of the disease, specimens of which were continually under his notice. It would be well, therefore, at this stage to reproduce this letter to the President of the Local Government Board almost as it stands.

Sir William Power's Observations.

“ Exceptional interest, public as well as professional, in recent years has been manifested in phthisis sanatoria as agencies in arresting the progress of

pulmonary tuberculosis in persons the subjects of this disease. An expectation is widely entertained that by means of establishments of this class the observed decline in this country of the death-rate from phthisis may be facilitated and accelerated. These matters, with other aspects of the question of prevention of tuberculosis, have engaged the attention of the Board, who in 1902 instructed Dr. Bulstrode to visit the public phthisis sanatoria in this country, and to report upon the various aspects of the sanatoria question.

“It was a necessary precedent to discussing the facts accumulated by him that Dr. Bulstrode should take account of the progress of knowledge as to the nature of tuberculosis, of its past and present prevalence in this country, and of the views that have been and that are entertained as to the share borne by one and another possible agency in the causation and in fostering of the malady. In this connection he has found himself called on to give attention to occurrence, antecedent to sanatorium days, of spontaneously cured tuberculosis—*i. e.*, to post-mortem detection of disease of this nature never recognized as present in the individual during life—and to occurrence also of much recognized pulmonary tuberculosis obviously of a chronic character. To tuberculosis in these aspects therefore he devotes the first seven chapters of his report.

“In succeeding chapters he deals historically with the circumstances and considerations in view of which the phthisis sanatorium as we know it to-day has gradually evolved; gives account generally of the phthisis sanatoria and hospitals for consumption now existent in England and Wales; and discusses in some detail the statutory powers possessed by local sanitary authorities, county councils

and boards of guardians for erection or acquirement of, and for participation in, sanatoria of this class. Later, he considers a large body of statistics relative to patients treated in sanatoria in reference to results, immediate and remote, accruing to such persons; and it is on the tuberculosis question in these other and important aspects that the data adduced by him are of special and immediate interest.

“As to the value of sanatorium treatment in pulmonary tuberculosis, Dr. Bulstrode does not consider it possible, or indeed desirable, to draw definite conclusions on the evidence so far available. But there can be no doubt, he thinks, that the *immediate* result to the individual of sanatorium treatment is in the main decidedly encouraging; commonly patients respond quickly and satisfactorily to the better food, the rest, the purer air, and the regulated living which are essential elements of sanatorium régime. He notes that the best immediate results are secured in the case of patients admitted to sanatorium treatment in the earlier stages of their malady, and that in the case of patients advanced in phthisis improvement of their condition, if it occurs, is commonly far less durable in its nature, notwithstanding a very remarkable temporary amendment not infrequently manifested in such persons.

“It is as to ‘after results’—*i. e.*, maintenance by the patient subsequent to discharge of his improved condition brought about by sojourn in a sanatorium—that he is hesitant. The statistics available to him, do not, he points out, furnish, save in exceptional instances, data as complete and detailed as is requisite in this connection. Too often ‘immediate results’ and ‘after results’ are, he considers, mingled and confused; and he submits a

method of tabular statement of facts designed in prevention of ambiguity thus arising. He would prefer that in judging the remoter benefit referable to sanatorium treatment all cases discharged from the institution within a period of twelve months should be excluded from consideration.

“ In this connection it is important to note that in his view ‘after results’ are largely determined not only by the method of selection of cases adopted by the sanatorium, but also by the ‘after care’ which can be bestowed on the patients in sequence to their discharge from the institution. ‘Fit for work’ he regards as an indefinite term by no means necessarily connoting ability of the discharged patient to follow day by day the employment customary with him antecedent to his illness. And he is of opinion that it is undesirable as a practice to send patients back at once to their former work, or to any employment entailing severe physical labour; work of the latter class should, Dr. Bulstrode thinks, not be engaged in by recently discharged patients unless prior to leaving the sanatorium they have been put through a series of labour tasks of gradually increasing severity, and in this way their ability to undertake a full day’s work sufficiently demonstrated. He notes, indeed, that at several sanatoria endeavour is being made to accustom patients to carefully graduated increase of physical exertion so as to prepare them for everyday labour on their discharge from the institution. As a system, however, this course cannot hopefully be adopted unless the sanatorium secures in the main patients which are suitable in the sense of being ‘early’ cases.

“ Whatever may be the precise value of sojourn in a sanatorium, he considers that there can be no question that the average of lasting benefit would

be materially enhanced were a system of selection generally adopted for securing as inmates persons in the earliest phase of their malady; and to this end he would see devised better machinery for attracting as patients those persons who are but beginning to manifest pulmonary tuberculosis. Indeed, upon this point there would appear to be little difference of opinion. But under existing circumstances, as is shown by him from a plurality of annual reports from sanatoria, there is much difficulty in securing cases of this class; difficulty so great that certain sanatoria come to devote no small proportion of their beds to the temporary accommodation in each instance of persons, the subjects of pronounced, perhaps of advancing phthisis, who are in need of disciplinary instruction as to managing the remainder of their lives in the best interests of themselves and others. Among conditions conducing to difficulty in securing 'early cases' are want of appreciation by the public of the importance of early recognition and treatment of phthisis, and, above all, indisposition on the part of the working man or working woman of this country to relinquish his or her employment. Parents, the subjects of phthisis, especially are averse to relegate their children to charity or to the Poor Law; and unless they are able to arrange for support of their families during their own sojourn in the sanatorium, are apt to avoid medical advice altogether, or to be content, while still continuing their employment, with casual attendance as out-patients at some hospital or dispensary.

"It is in securing early cases of phthisis for sanatorium treatment that Germany would seem to be in advance of this country; a circumstance due, no doubt, in no small degree to the far-reaching system

of compulsory insurance of workpeople against sickness and incapacity which is in force in the German Empire. By means of this system the workman when attacked by tuberculosis has a legal claim on insurance funds for medical treatment and maintenance in his own case and for the support also of his family. Thus it comes about that he can, without social disqualification such as is associated with receipt of Poor Law relief or of charity—without, that is, forfeiting in any degree his sense of self-respect—procure at once at the very onset of his malady treatment requisite for himself, and at the same time maintenance of those belonging to him. Dr. Bulstrode evidently regards the workmen's insurance system of Germany as having played a very important part in the reduction of pulmonary tuberculosis during recent years in that country; and accordingly he supplies—Part IV of his report—a full account of the manner in which the insurance system in question is calculated to aid and promote administrative effort in repression of this disease.

“To the vexed question of ‘notification of pulmonary tuberculosis’ Dr. Bulstrode devotes a separate section of his report. In it he gives account of the more important steps which have been taken in the way of adoption of phthisis notification, ‘voluntary’ and ‘compulsory,’ and supplies interesting and instructive charts exhibiting the behaviour of phthisis in the matter of death-rates in different towns *before* and *after* adoption of the one or the other measure. He does not consider that the time has yet arrived for judging, in the light of phthisis death-rates, the value of ‘notification’ in repression of pulmonary tuberculosis; and he makes no pronouncement on this question. Mean-

while he notes that, so far, the rate of that fall in the phthisis mortality which has for many years been witnessed throughout this country, has not become obviously accelerated in towns which have in one form or other adopted notification of the disease, and he awaits further study of the subject on lines similar to those indicated by him. Whether or not 'notification' is, along with other measures, conducing in the present to diminution of sickness, of incapacity, from phthisis, is quite another matter, and he recognizes that acceptance of the current working theory that pulmonary tuberculosis in man results in the main from case to case infection has tended in many districts to the adoption of measures which must needs be exercising wholesome effect on public health generally; as for instance by house to house inspection of working-class dwellings and incidental instruction of their inmates in the elements of hygiene, personal, domestic and public. As to the relative advantages in the above sense of 'voluntary' and 'compulsory' notification of phthisis, he is unable, in the present at any rate, to give preference to compulsion, and he lays stress on the abiding disabilities liable to accrue to the phthisis patient in the event of pulmonary tuberculosis coming to be regarded officially as infectious in like sense with scarlatina or smallpox. It is clear, indeed, that in his view, notification of the disease should not be made compulsory except under special enactment such as (at Sheffield and at Bolton) expressly dissociates administratively phthisis and every-day infectious disease. As a practicable matter, he considers that notification of the disease will be acceptable or the reverse to the public of our industrial areas according as definite assistance is customarily afforded to sufferers by the

malady, and he cites the experience of Brighton as indicating that where obvious personal advantages accrue to the patient—where he is not harassed in a social sense as the result of being found phthisical—a system of ‘voluntary’ notification may yield useful results.

“On the other hand, Dr. Bulstrode is of opinion that where the confidence of the patient is not respected, where help is not accorded him and his family also in their trouble, or where as the result of the sanitary authorities’ ministrations the phthisical person becomes publicly ostracized, notification whether ‘compulsory’ or ‘voluntary’ is likely to fail almost wholly in securing the object which it is intended to serve. He considers, indeed, that under circumstances of stringent administration based on notification, not a few phthisical persons would be tempted to conceal their malady until a stage of the disease was arrived at so advanced as to preclude any but fatal results. In his view, definite encouragement of people to seek advice and assistance at the earliest stage of their phthisis is strongly called for alike in administrative as in public health sense.

“Dr. Bulstrode embodies in his report observations as to considerations to be held in view in making selection of sites for sanatoria and on conditions to be borne in mind in arrangement and construction of sanatorium buildings.”

Relation of the Bovine and Human Disease.

The report we are now considering was ordered by Mr. Walter Long in 1902. That was soon after the dramatic statement by Professor Koch in London in the summer of 1901. On that occasion Koch declared his disbelief in the bovine origin of the disease in the human,

and by thus expressing his independent opinion he became incidentally the means of upsetting, for a time, the progress of certain preventive measures. These were based on an assumption which now, several years later, appears from the findings of our own British Royal Commission, of which Sir Michael Foster, K.C.B., F.R.S., and, afterwards, Sir William Power, K.C.B., F.R.S., were chairmen, to have had a sound foundation.

The immediate effect, however of Koch's pronouncement was to concentrate attention on human infection, the provision of sanatoria, and the adoption of other preventive measures against the personal spread of infection. In fact, much impulse was given to a movement which had already made some way, and which had for its object a change in our habit of regarding the manifestations of tuberculosis by placing it among the infectious diseases calling for daily attention.

The remarkable Brighton Achievement.

Some two or three years before the meeting of the International Tuberculosis Congress just referred to, Dr. Arthur Newsholme, with the ability, industry, and indefatigable perseverance characteristic of his work, had succeeded in introducing in the county borough of Brighton a system of voluntary notification, inquiry, advice and *help* to persons suffering from consumption. In this manner was formed the basis of an organization immediately fruitful of good results. Upon this was engrafted a boldly conceived and, as it has proved in this particular instance, successful plan of sanatorial aid, treatment and isolation of phthisical cases mainly by municipal action, though assisted to some extent by voluntary endowment. The boldness of the experiment, for such it must be styled, consisted in the reception of consumptive persons in an ordinary isolation hospital, not,

of course, to mix with cases of scarlet fever, diphtheria and typhoid, but to be treated under the same administration in one of the pavilions which lie side by side, and which, on a small scale, may be compared in arrangement to those of St. Thomas's Hospital as seen from Westminster Bridge. From the first—that is in 1899—Dr. Newsholme's innovation attracted the attention, not only of expert officials, but of teachers in public health at the London schools. As regards the method of isolating consumption, although the Brighton Sanatorium, situate as it is on the height of the chalk downs to the east of the town, might be admirably adapted for open air treatment, we must remember that risks of cross infection existed.

At a meeting at Brighton inaugurated by the Royal Sanitary Institute, and presided over by the mayor of the town on October 27, 1906, the nature of these risks, added to those of an ordinary isolation hospital, was fully discussed. Great significance was attached by the experts present to the statement which could then be authoritatively announced, that *no occurrence of cross infection since the establishment of the new system could be recorded*. Not—be it understood—that the risks were unreal, but that their avoidance constituted a remarkable tribute to the loyalty of the hospital staff in carrying out the precautions desired by the chief medical officer, whose enthusiasm had inspired all its members. At the same meeting the financial and economic aspects of the system were reviewed by speakers, who dwelt on a fact of interest and importance to county and municipal councils alike. This was that the rate for the maintenance of the department over which the medical officer of health presides did not, at Brighton, exceed 4*d.* in the £ of the rateable value of property. In other words, the sum yielded by that rate covered every official expense, including the provision of laboratory, sanitary inspectorial work of all kinds, clerical, health visiting, etc.—in short, everything that

now-a-days is considered essential in the constitution of a municipal health department. The arrival at this eminently practical result may be taken as satisfactory proof of the success of a very instructive and valuable experiment in preventive medicine. The conclusion to be drawn from the experiment, for such it must still be termed, is that it is possible, under favourable circumstances, to carry out such sanatorium treatment of phthisis as seems necessary for the safety and welfare of the community, and to do this without any marked encroachment on the rates. This is, indeed, an achievement to be proud of, and very naturally it has caused attention to be directed not only to the value of sanatorium treatment as part of a municipal or county scheme for phthisis control, but especially to the practicability of using empty wards or empty hospitals for the provision of the needful accommodation.

The Chief Medical Officer of the Local Government Board.

A year or two later, at the beginning of 1908, on the retirement of Sir William Power, K.C.B., F.R.S., Dr. Newsholme was selected by the President of the Local Government Board for appointment to the Chief Office at Whitehall, where he was welcomed as *primus inter pares* by gentlemen who were already known to the world at large for their valuable national and international services. As in connection with our subject particular notice is taken of sanatorium and isolation hospital treatment, it should be mentioned that the achievement above mentioned is one of several like achievements accomplished by Dr. Newsholme while at Brighton. He was, in fact, master of all the scientific and administrative business of his department, and his appointment as a representative Medical Officer of Health was regarded with every sign of appreciation by Medical Officers of Health

generally. In his present position Dr. Newsholme has already utilized his opportunities for promoting the use of hospitals on the lines above indicated. His book on the Prevention of Tuberculosis must have been quite ready for publication at the time of his appointment, as it appeared comparatively soon after that date—*i. e.*, July, 1908. It is a most comprehensive work, written in lucid style and in an interesting manner. Like the volume previously described in this chapter, it will be found indispensable to those engaged in the preventive treatment of diseases which are in any degree infectious.

Factors in the Reduction of Phthisis Mortality.

We must now revert to aspects of the Tuberculosis question, some of which were considered with due weight in the opening chapters of Dr. Bulstrode's work. For the purpose of their further discussion it should be premised, firstly: that, notwithstanding the widely disseminated condition of the disease tuberculosis, the death-rate in England and Wales from consumption alone having been 23 per 10,000 persons living in 1868 and 1869, fell steadily and almost year by year, until it was only 11·5 per 10,000 in 1906. Secondly, that this very marked reduction of 50 per cent. in less than forty years must almost certainly have been the result of a combination of influences. Let us now briefly consider the probable relative importance of these influences or factors.

(1) Water supply, sewerage, sewage disposal, paving, filth removal, cleansing and drying of the ground on which dwellings stand—in short, all that is comprised in the words "*Municipal Sanitation*" surely deserves the first place as a factor in the reduction of phthisis mortality. The fundamental importance of this great work, the prosecution of which was the chief aim of Chadwick's life, is admitted by all. Without it other sanitary improve-

ments could not have been proceeded with; and further, in spite of what may be said to the contrary, it did actually, as the late Sir George Buchanan, F.R.S., conclusively proved, remove an influence which favoured the development and maintenance of consumption death-rates. This is effected by making the earth on which houses stood clean and dry instead of fœtid and damp. Those who have been familiar with the courts and alleys of slum areas before and after the introduction of works of constant water supply accompanied by means of well-planned drainage and adequate paving, will call to mind the striking change that took place. The atmosphere of the court would lose its foulness and become comparatively sweet and wholesome, the soakage of filth into the very ground which was actually in aerial communication with living-rooms ceased, and the incubation of countless disease organisms was checked, the condition of the earth itself (the incubator), which often lay immediately beneath the rooms, having been altered for the better. As regards the practical outcome of this alteration, it may be a question of secondary importance how benefit to the individual came about, whether by increasing the resisting power to attack or decrease in the strength of the attacking force, whether by removing dampness or by improved quality of the breathing air, the number and vitality of infective organisms being lessened. The fact remains that diminution of consumption synchronized with beneficent work of water supply and drainage applied to crowded areas. It has long been recognized that the value of such work to the public health was manifested in more ways than one.

(2) *House accommodation*.—It was by initial work such as that above mentioned, in which sanitary engineers were chiefly engaged, that the way was prepared for the equally important measure of improving the dwellings of the people under the Public Health Acts, carried out as

they have been by the direction and agency of medical officers of health and sanitary inspectors. It is beyond all dispute that the daily work ordered by local sanitary and Public Health authorities, and persevered with year by year throughout the last four decades, has wrought an immense change for good in the lot of the working classes. Taken in the mass there can have been no more potent influence in reducing the amount of consumption mortality than the sum total of many millions of house improvements effected during that eventful period, which included the latter half of Queen Victoria's reign and that of King Edward VII. The removal of "nuisances injurious to health" (sometimes apparently of small importance when taken in detail), increase of light and air about dwellings, the ventilation of rooms, the increase of breathing air space, the diminution of overcrowding, the removal of house dampness (from whatever cause it may have originated), the whitewashing and cleaning of dirty houses, the better closet accommodation, and other advances in house sanitation too numerous to mention, constitute as a whole, a factor of prime importance in preventive medicine. The "housing question," as it is now called, is still with us, and it would indeed be a bad day if it were ever relegated to a position of secondary importance in preventive medicine generally and the reduction of phthisis in particular.

(3) *Social betterment and the diffusion of sanitary knowledge and its personal application.*—Here again we have another influence which has been operating slowly but surely in the same direction as the two first named. Better wages, better quantity and quality of food, more healthy open-air exercise for indoor workers of all sorts, and more healthy ways of living generally, all these influences very properly have the credit of raising the standard of the public health in our own country and the colonies. Of late years the need for attention to personal

hygiene has indeed so impressed itself on the public mind that many ways have been devised—some of them borrowed from the United States—of bringing home, especially to the mothers of families, physiological truths which are so important to the individual, and consequently to the public health. It is to the growth of this national conviction of the necessity for widening the scope of preventive medicine that much recent legislation has been due. It would seem, indeed, that an extension of the principle of insurance against sickness is but the natural and logical sequence to what has gone before.

(4) *Factory and workshop legislation and improvements.*—This might perhaps be considered as a part of social betterment. But—inasmuch as in some manufacturing towns and districts the death-rate from the occupational disease comprises a much larger proportion of fatal affections of the lungs and air passages, due either to phthisis, fibroid phthisis, or broncho-pneumonia, than in other towns—it is well to mention this influence in the enumeration of the prime factors in the prevention of consumption separately, affecting, as it does, only certain parts of the country.

(5) *Raw milk and the imperfectly cooked flesh of animals affected with tuberculosis* (as pigs are especially liable to be) are now ranked by the best authorities among the principal factors which have to be reckoned with in dealing with phthisis prevention. It would, indeed, seem strange if a national scheme for this purpose were to leave out of consideration a cause of tuberculosis which, through cow's milk, is manifested in infants, and which may be the source of far-reaching trouble and expense. The authorities of Leeds, Manchester and several of our largest cities in the North, have for a good many years had in operation clauses in special local Acts of Parliament giving to them powers similar to those now possessed by the London County Council. In these days, when

railway-borne milk forms such a large proportion of that consumed by the seven or eight million inhabitants of Greater London, it is anything but satisfactory to contemplate the considerable proportion of samples taken by the milk inspectors for bacteriological examination, which prove to contain the tubercle bacillus. It is small comfort to be reminded that the late Professor Koch, bacteriological genius though he undoubtedly was, gave the opinion as stated above, more especially when we read the findings of our own Royal Commission after their very long and exhaustive inquiry. Their report conclusively shows that the great German professor, to whose labours in the cause of preventive medicine we owe so much, was unfortunately mistaken in his, perhaps, too hastily expressed opinion of ten years ago. The subject of the purity of the milk supply is one that is now receiving attention from the legislature.

(6) *Notification of phthisis, friendly supervision of sufferers from the disease, the preventive control of the disease by sanatorium and dispensary systems of treatment and prevention.*—The importance attaching to this subject has already been indicated. Its discussion will now become a matter of necessity by authorities which have hitherto had no direct or implied responsibility in the preventive treatment of phthisis. Speeches in public are sometimes made as if the establishment of sanatoria was part of the statutory functions of a sanitary or Public Health authority. This has not been the case. On the contrary, the attitude of the Local Government Board under former advice was to regard tuberculosis as belonging to quite a different category to those diseases, the notification of which was provided for or contemplated in the statute of 1889. The constitution of an active National Tuberculosis Prevention Association some years ago, the vigour of their propagandist campaign, together with the strenuous advocacy of a few prominent medical officers of

health, especially Dr. Newsholme himself and Dr. Niven of Manchester, have now produced important legislative efforts. These ladies and gentlemen believe that by making phthisis a notifiable disease its decline will be markedly accelerated. Nothing less than a confident assurance that such acceleration would take place could warrant a general inclusion of phthisis in the national schedule of "notifiable diseases." It is in connection with the notification question that the relative value and importance of the several factors above enumerated require careful consideration.

The Six Factors, Their Separate and Collective Value.

At one of the closing meetings of the old Epidemiological Society, just before it became merged in the Royal Society of Medicine, a discussion arising out of a paper by Dr. Newsholme took place. The subject was the different factors concerned in the decline of phthisis and the part each of them severally played in the beneficent change. Each of them had its champion, who would yield to no one in upholding the surpassing claims to supremacy of the factor to which he was attached. But, in the end, it was shrewdly observed by an ex-president of the Society that, being, as it was, a matter of personal predilections, unanimity could be no more expected than among the knights of old who were prepared to do battle each for the lady to whom he had sworn fealty. The writer would hardly expect the order in which he has placed the factors to meet with the entire approval of the advocates of the "sanatorium," even when the term is used in the wide sense now given to it. But for the moment, waiving all claims to superiority of this or that influence in phthisis reduction, there are two important considerations that it may be well to bear in mind before we fix our faith too much on the efficacy of any particular

set of conditions in the anti-tuberculosis plan of campaign. The phrase *stamping out*, as applied to infectious diseases, was far too commonly used when medical officers of health came into existence in 1872. Subsequently, though the expression may be said to have been probably justified in the case of Asiatic cholera and typhus fever, it would certainly not be so with influenza, measles, whooping-cough, or even scarlet fever, diphtheria, or typhoid, which were always classed as strictly preventable diseases. In subsequent chapters evidence will be afforded that however valuable hospital isolation may have been in assisting in the reduction of scarlet fever mortality, for example, the common use of the term "stamping out" in the prospective sense during the seventies and eighties is perceived now to have been singularly inapt. We learn from our partial failures and disappointments as much as from our successes in preventive measures, and the lesson taught us by experience of the behaviour of scarlet fever is *not* to create over-sanguine expectations of complete success in the promotion of schemes of prevention with comparatively limited objective.

The second point to which it may not be amiss to call attention at the present day is that the vast amount of local government work by which all these reforms and improvements are directed is voluntary and unpaid, and that, in the near future, there may not be found either gentlemen or ladies with the qualifications necessary for the undertaking of such important responsibilities as are devolving on our numerous councils and other representative public bodies. Committee work in councils has even now reached enormous proportions when compared with what it was formerly, and if the energies of the best men engaged in local self-government become absorbed in one department, there arises some risk of other departments being diminished in efficiency and ultimately

starved out of existence. For example, the problems connected with the operation of the Housing and Town Planning Act require a large amount of consideration, and so will schemes for phthisis prevention on modern lines. Is it to be expected that the same amount of consideration and money will be available for each of these two important measures as if one alone absorbed attention? Some who are well able to judge evidently have their doubts on this point. Then again, the number of voluntary leagues having for their object the furtherance of one particular branch of Public Health work, *e.g.*, prevention of tuberculosis, nursing reform or physical training of children, etc., is increasing, and each one of these leagues or societies claims support from the public purse, rivalling the others in advocacy of its cause. Caution in advancement is therefore necessary; for—admitting to the fullest extent the great and increasing demands on public attention which the preventive side of “medicine” is now making—the means for complying with these demands, without recourse to revolutionary methods, cannot be said to exist.

Some Necessary Considerations.

This is but a brief review of the tuberculosis prevention question regarded from the administrative point of view, but even as such it is hoped it will be useful. If county councils are to have an actual or implied responsibility in providing “sanatorium treatment”—a comprehensive term which may be taken to be as equivalent to much that is described in these pages as “preventive treatment”—then many fresh arrangements will become necessary. Among the chief points for consideration will be the utilization of existing hospital accommodation for the reception of advanced as well as early cases of phthisis, for it is cases of the first-named kind that are apt

to become foci of infection in the dwellings of the poor. At the isolation hospitals generally there may be, from time to time, empty rooms or wards with many beds available, but the circumstances under which this class of accommodation comes into use may be as different from those of the model town of Brighton, as are those of Leicester in the matter of smallpox control by methods auxiliary to vaccination. In other words, the differences in the degree of development of the sanitary medical service and Public Health organization may be so marked that, whereas some districts may be said to be prepared to assume fresh duties and responsibilities, others, the majority it is feared, are more or less unready to do so. The system of local self-government, so dear to Englishmen, has its disadvantages as well as its advantages, and among the former is the freedom allowed to local councils (if its members are so disposed) to practically ignore their functions as sanitary and Public Health authorities. Indeed, we must be on our guard against arguing or advising too much from the standpoint of the "particular" to that of the "general." There are several instances which we can recall in the history of preventive medicine which would serve to illustrate the fallacy of procedure based on such a line of reasoning. Some further discussion of this important aspect of our subject will take place in the concluding chapters of this work. The present chapter may well end by reference to one of the most important Memoranda ever issued by the Privy Council or the Local Government Board, viz., that by Dr. Arthur Newsholme, the Chief Medical Officer, on Administrative Measures against Tuberculosis. It is published in pamphlet form at slight cost and is obtainable through any bookseller.

CHAPTER IV

SCARLET FEVER

THE COMPULSORY NOTIFICATION AND HOSPITAL ISOLATION
SYSTEM AS APPLIED TO SCARLET FEVER : AN ANALYSIS
OF 17,541 CASES OCCURRING IN A PERIOD OF
THIRTEEN YEARS.

THIS chapter and that which follows next but one are based on a report to the Surrey County Council and relate to the experience gained in the administrative county of Surrey during the thirteen years 1895-1907 inclusive. It was circulated freely in the County at the time of its publication, but has not to any extent been brought under notice outside. As the subject is of immediate interest to Public Health authorities it was considered desirable to further discuss it in the course of the Chadwick Lectures with the assistance of diagrams, some of which, with the consent of those concerned, are reproduced in this volume.

It should be added that during the past two or three years the attention of experts in Surrey has been directed to the conclusions arrived at in 1908. They have been the subject of much correspondence among medical officers of health in the County, and there is every reason to think that the teaching of past experience has had its effect and that improvement has taken place, though the time is, as yet, not sufficiently long to admit of this being in evidence. But alterations in our preventive measures of a more radical nature than have hitherto been attempted

are called for now. They will be described in the concluding chapter of this book on Public Health Organization and Preventive Medicine.

Review of the Notification and Isolation Hospital System.

It is over thirty years ago, *i. e.*, some five years after the Public Health Act, 1872, came into operation, that sanitary authorities, which had appointed medical officers of health to specially advise and assist them in the exercise of their powers, began to find the need of information as to the prevalence and extent of epidemic diseases. Up to then the death records were the only reliable sources of information, so that it was impossible to say at any time what number of cases of epidemic disease actually prevailed in a town or district.

Preventive measures were in consequence impossible. This helpless condition was most keenly felt in the occurrence of outbreaks of smallpox or scarlet fever when the sanitary authority was liable to be suddenly called upon to provide hospitals for the sick who were here in the language of the Statute "without proper lodging accommodation." It was under such circumstances that the towns of Bolton, Huddersfield, Nottingham and Leicester obtained local Acts of Parliament, the provisions of which foreshadowed those of the national Notification of Disease Act of 1889. But, although the principle on which these local Acts were based subsequently found gradual acceptance not only in England, but abroad, there was undoubtedly strong opposition to them at first.

At the time now spoken of, 1877, there was a growing and possibly exaggerated fear of personal infection. In former times people had been almost reckless in this matter, regarding the infectious diseases, especially of children, as practically inevitable. It was as a strong

protest against this dangerous carelessness that the demand arose for the notification of cases of scarlet fever—such demand being based, to a considerable extent, on the belief that it was practicable by means of nearly complete isolation of the sick to prevent epidemic spread of a disease such as scarlet fever. These growing opinions found expression in the year 1881, when the publication of the well-known volume of the Medical Department of the Local Government Board gave the results of the inquiries throughout the whole country by Dr. (afterwards Sir Richard) Thorne-Thorne on the *Use and Influence of Isolation Hospitals*.

The story is there told over and over again of the success attending the removal of the first case of scarlet fever from a household of presumably susceptible children. By "early removal" was meant that soon after the symptoms had declared themselves and had been diagnosed by a medical practitioner, arrangements were made for the removal of the case to a hospital. The cause of infection thus being taken away and the room of the sick person having been immediately and carefully disinfected, no further cases arose in the household. Furthermore, the members of the household were free from quarantine. Such were the beneficial results that were seen in thousands of instances, and, furthermore, to the credit of our isolation hospitals, such are the beneficial results generally to be seen at the present day.

It seemed a perfectly legitimate inference to be drawn that, given an absolute system of compulsory notification and given also opportunity of suitable hospital isolation, the centres of infection must necessarily tend to be gradually extinguished, so that, in due time, an appreciable effect upon epidemic diseases must be manifest. This very reasonable anticipation was expressed at Bolton, Huddersfield and Nottingham in 1877. The opinion then held and since repeated was that a hospital of this kind,

being primarily for the purpose of isolation, having been used as an extinguishing agent of infection and having done its work effectually, would tend in the course of time to be less frequently in full occupation. That is indeed, to put it plainly, the *raison d'être* of an isolation hospital; it is not primarily a place for the care and treatment of an infectious disease, but exists mainly for the purpose of preventing its spread. Judged on its merits, its success should, therefore, ultimately depend on its effect in the reduction of epidemic diseases.

At the time Sir Richard Thorne-Thorne made his investigations, much interest centred in the town of Warrington, in Lancashire, because it was there that a thorough policy of isolation and stamping out of scarlet fever was first attempted. The Chairman of the Public Health Committee of that town was so earnest and sanguine in his belief that such was possible that he presented a site for a hospital to the town, and the policy of compulsory removal of cases of scarlet fever was, as the writer knows, carried out with the utmost determination. It was no light matter at that time to undertake such drastic measures, for scarlet fever was a much more dangerous disease then than now, and to enforce the removal of a child from its parents under such conditions required great firmness. Indeed, there was at that time a vast amount of sentiment against hospital removal to be overcome.

To those in a position to contrast the circumstances under which Public Health work was carried out then and now, the change that has taken place seems perfectly marvellous. We now have hospitals provided on a most generous scale, and the disease for which the children are now removed is comparatively a mild one. There is practically no opposition to removal in the present day. The hospitals are popular institutions to which parents gladly send their children, knowing they will be well

housed and cared for during several weeks. The hospitals are seldom empty and sometimes full to overflowing. By some persons this fact alone would be regarded as evidence of failure. But though free to admit that at present a modified view of the advantages of isolation hospitals for scarlet fever must be taken, the writer is far from agreeing with what may be termed a pessimistic view of their value from the purely preventive aspect.

Scarlet Fever Mortality.

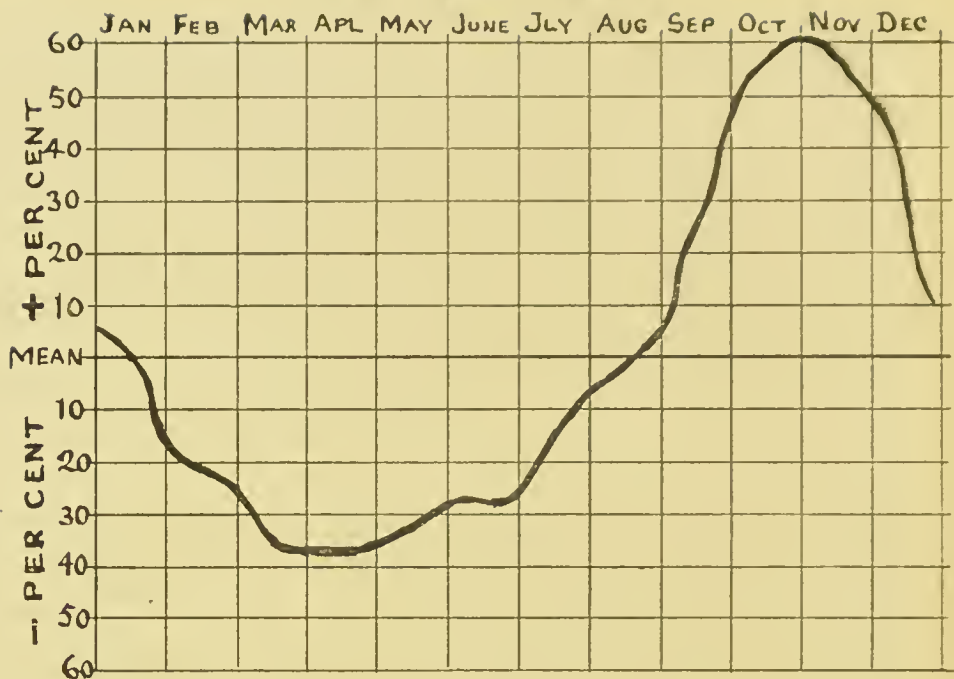
In the first place, we have to consider our subject as affecting scarlet fever mortality as well as scarlet fever incidence or sickness rate.

The chart to which attention is now drawn is a reproduction of one used in the writer's lectures to the Public Health class at St. Thomas's Hospital Medical School. It was originally prepared in order to show the characteristics of scarlet fever and its tendency, like some other epidemics, to prevail in cycles or seasons. These cyclical periods may be compared, first of all, to the ripple; further back to the wave, and behind that, at an indefinite distance, to the swell in the great ocean of time. In the case of scarlet fever there should be noted the tendency, first of all, to the seasonal prevalence (the ripple). This can generally be reckoned on with certainty, so that in times of epidemicity a considerable increase in the demand for beds may be expected in the autumn.

The accompanying Diagram (D) illustrates the different seasonal chart in the case of two diseases, scarlet fever and whooping-cough, the one being prevalent in the autumn and the other in the spring.

Behind the seasonal curve there is the periodic chart Diagram (E) showing the tendency that exists or used to exist on the part of scarlet fever to occur in epidemic form at intervals of about five years, that being

Scarlet Fever



Whooping-Cough

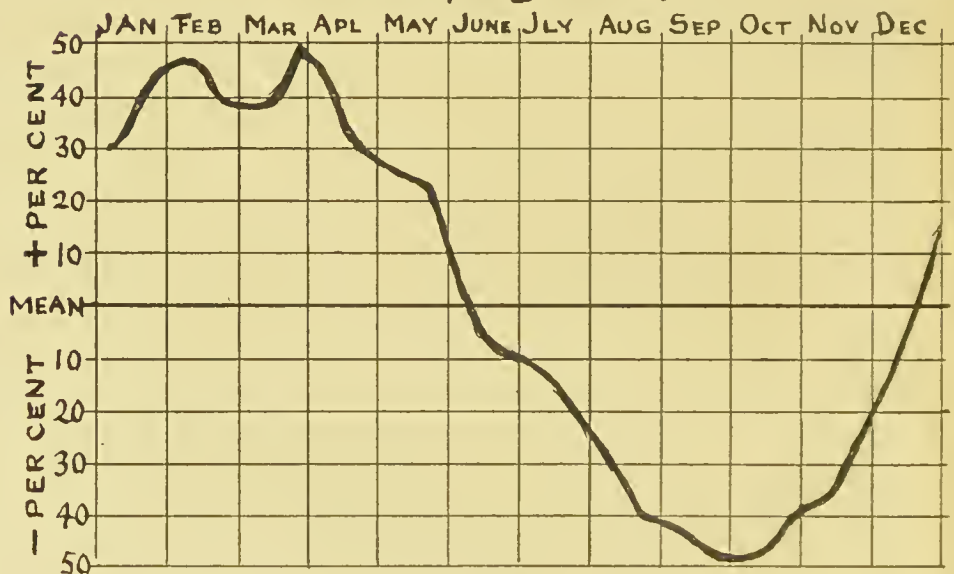


DIAGRAM D.

CHART OF CURVES SHOWING THE AVERAGE PREVALENCE OF SCARLET FEVER
AND WHOOPING-COUGH MONTH BY MONTH.

From the Surroy Series. Seasonal curves of scarlet fever. The thick black line is based on mortality statistics of many years. Whooping-cough is shown as a contrast.

the period which separates the crest of each succeeding wave, the dip between the crest representing the period of non-epidemicity. Behind that again lies the mysterious influence which affects all epidemic diseases, causing them to arise in conditions of virulence and activity after long periods of subsidence, quiescence or entire disappearance.

The mortality chart Diagram (E) now referred to shows another even more important fact, and that is the gradual diminishing mortality in scarlet fever. Taking the highest columns, viz., those of 1863-4 and those of 1869-70, it will be seen that the fall which took place afterwards, though unlike the uniform slope of an inclined plane, is still regular and continuous by steps, each quinquennial crest tending to be lower than the last. The result of this gradual decline being that at length we have, in proportion to population at the present time, an amount of mortality only one-sixth of that which prevailed in this country about the period referred to at the beginning of this chapter. Here, indeed, is a most striking phenomenon, for at the present day scarlet fever causes far less mortality than measles. What is the meaning of it? Is it because, like typhoid fever, the disease has become less frequent in occurrence, or is it because it is of a much less virulent type, that is to say, in other words, an illness of a much milder kind than formerly?

Change of Type from Malignant to Mild Scarlet Fever.

There is a general belief in the Public Health department of the medical profession that the latter is the real explanation, and that, in fact, the diminished mortality of scarlet fever is the result of a lessened morbidity or fatality rather than of a lessened prevalence. In other words, the proportion of mild to severe attacks is much greater now than formerly.

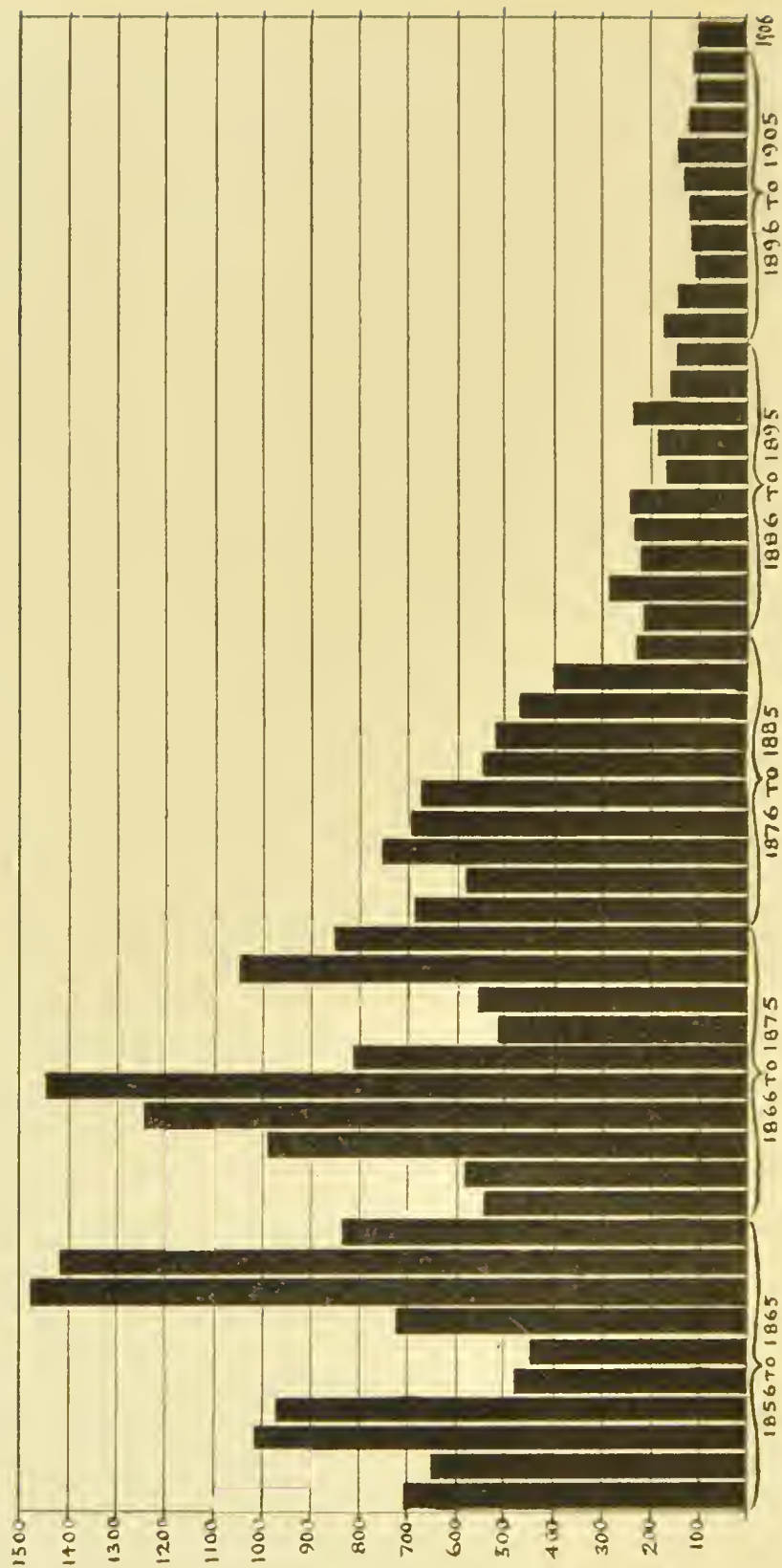


DIAGRAM E. From the Surrey Series.

ENGLAND AND WALES. CHART OF THE SCARLET FEVER MORTALITY RATES PER MILLION PERSONS LIVING FOR THE 51 YEARS 1856-1906.

Shows the periodic changes of scarlet fever. N.B.—The low rate has been continued since 1906.

It is true this belief is founded on impressions and personal recollections rather than ascertained facts. There are, in fact, insufficient data for strictly scientific comparisons on a large scale, for it is, as already explained, only within the last twenty years that the system of notifying cases of illness from scarlet fever became general. Until 1889, it was only the deaths that were certified throughout England. Still, the impression referred to is a very strong one, and is based on facts not easily to be forgotten. For example, the class of cases in which the malignancy of scarlet fever attack was such as to cause inflammatory conditions of the glands and neck, giving rise to the appearance of the patient known as "bull-neck," was certainly much more numerous formerly than is the case now.¹ Now, accepting the dictum that the disease has really become mitigated in severity, let us consider on that basis the inferences that we are entitled to draw.

Referring again to the mortality chart, it is plain if we take the twenty years 1866-85 and compare them with that of the twenty years 1886-1905, that the latter series of columns is much dwarfed as compared with the former, and that the waves of prevalence, which were previously close together and of steep inclination, tend in the latter series to become broad undulations of a much less marked character.

Now seeing that it is during the latter period (1886-1905) that the notification and isolation system has been brought generally into operation, we naturally claim this as evidence in its favour. But when we come to examine impartially the basis of this claim, we are bound to note

¹ Dr. Sidney Phillips, M.D., F.R.C.P., Senior Physician to the London Fever Hospital, dealt with the subject of the change of type in scarlet fever in his Presidential address delivered before the Harveian Society in 1908. This address will be referred to again in connection with the mitigation in the *severity* as well as the diminution in the *prevalence* of typhoid.

that between the period of 1866 and 1875, the height of the wave crests had already sensibly fallen, and that before 1885, the decline was unmistakable, so that at the time the 1889 Act came into operation, the mortality reduction, for some reason, had not only commenced but was already far advanced. Our last reeorded column, for

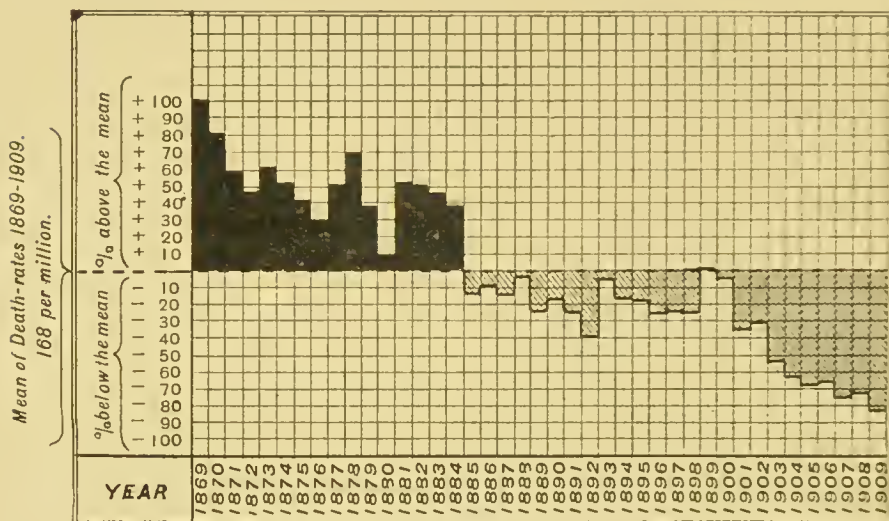


DIAGRAM F.

London Series. Scarlet fever death-rates for 51 years. Showing marked decline especially of late years.

example, measures 100, while that of 1889 measures no more than (that is *only*) between 200 and 300, whereas if we go back to 1869 the height of the column is over 1,200. Having regard, therefore, to the whole series of columns in this lessening scale, we cannot fail to realize two important facts, viz. : one, that a gradual lessening of what was formerly a serious cause of mortality has taken place ; and the other, that such reduction of mortality must have resulted from more than one cause.¹

¹ The remarkable reduction in Scarlet Fever mortality is also shown by Diagrams F and F1, relating respectively to London and Liverpool, two of the most densely populated great towns in England.

CITY OF LIVERPOOL SCARLET FEVER DEATH RATE PER 100,000 1849-1909

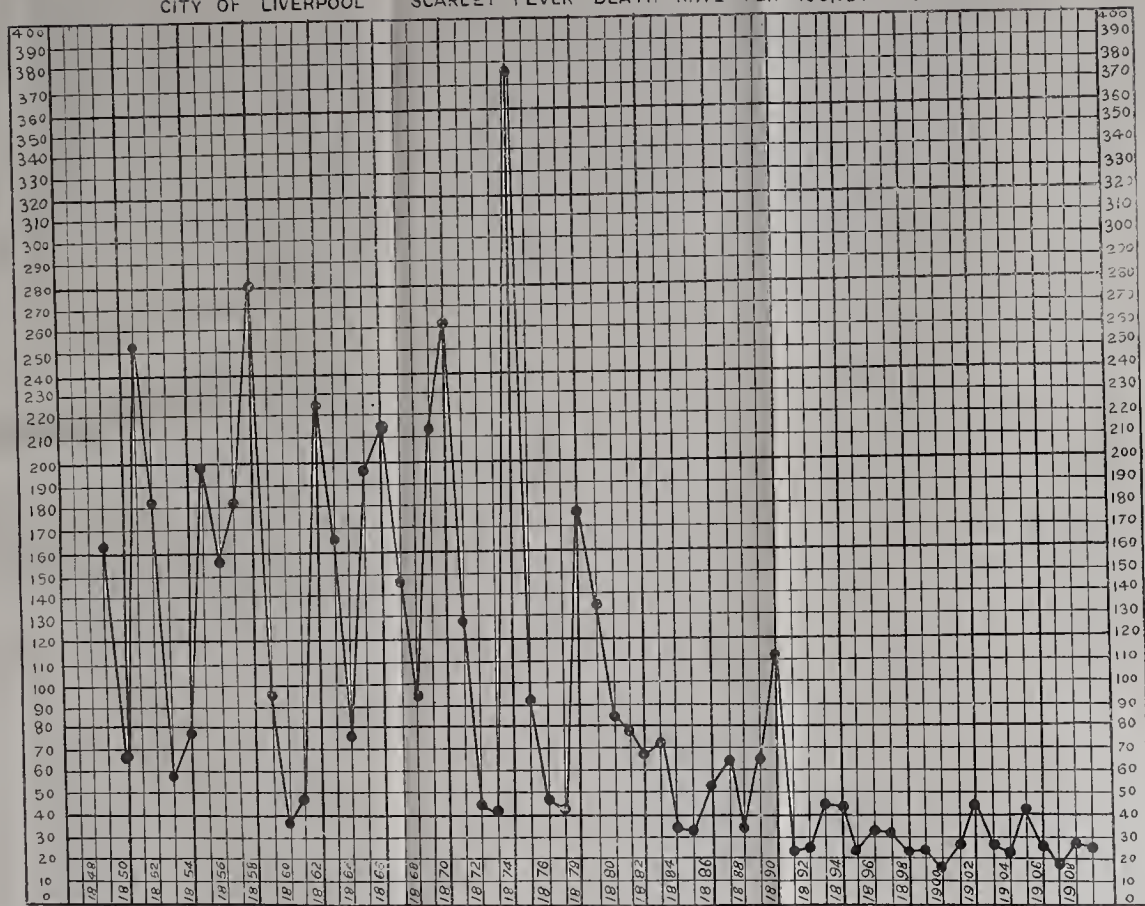


DIAGRAM F1.

Showing the marked decline in the death-rate in 60 years.

The Causes of the Change.

Every one who is acquainted with the history of sanitation in this country, knows that at or about the period when malignant scarlet fever, like typhus and typhoid fever, was at its worst in large towns, overcrowding received attention, as did also the cleanliness, ventilation and construction of dwellings, and great works in sewerage were introduced by the sanitary authorities. Along with these fundamental improvements, movements were proceeding for social betterment of the masses in food and clothing, as well as housing. And not the least of the contributory causes for the improvement of the public health was the personal influence in the promotion of sanitation and precautionary measures at home. The work of the medical officers of health and sanitary inspectors is now referred to. It is through their efforts amongst the insanitary and careless classes of the population, that so much has been done in the past. Now, all these causes operating together, must have tended to bring down the mortality, if not the prevalence of scarlet fever. But without seeking to attribute to hospitals an undue influence we can at least claim that they also must have materially contributed to the satisfactory result.

In judging this claim it is only fair to bear in mind that though it is true the system of compulsory notification, with the extensive operations that followed, dates back for only twenty years, whereas the decline in scarlet fever began several years before; it is also true that the establishment of charitable and rate-supported free hospitals had commenced long before 1889, the more severe cases being removed to these establishments. Those of us who studied medicine at the London Fever Hospital in the Liverpool Road as well as at the general hospitals in the sixties were familiar with these facts.

It is, indeed, difficult to believe that the removal of

such cases from dirty, overcrowded houses, into the favourable atmosphere of a well-appointed hospital can have had any but a powerful influence in preventing the perpetuation of a severe type of the disease. Is it not far more reasonable to suppose that hospital removal did formerly, as it does even now, a vast amount of good in certain slum localities and overcrowded houses and cottages, by removing sources of infection of the worst kind? It is, of course, impossible to say exactly in what proportion this particular action contributed to the marked decline of scarlet fever mortality in the past half-century, for during that time sanitary improvements of all kinds have been in progress. But that it exercised a potent influence seems certain. The proof of this lies in two directions, one being the present light scarlet fever death-rate, and the other the low rate of case mortality.

Light Scarlet Fever Death-rate and Low Case Mortality.

As regards the figures relating to the death-rate per million since 1889, happily they have always been small. See Diagram E and Appendix, chart 1, p. 180. Special hospitals during this period had been already pretty generally established. The diminution in the death-rate must, therefore, at any rate in part, be placed to their credit.

The low rate of case mortality, that is to say the deaths per hundred of cases, has been frequently commented on of late. That of the last two years is only about 2 per cent. There is every reason to believe that twenty or thirty years ago it was about ten times that amount, *i. e.*, some 20 per cent.¹

Thus much therefore stands to the credit of hospitals in respect of scarlet fever mortality.

¹ Although there has been a very marked lessening of the severity or morbidity of scarlet fever in this country, we are still liable to its recurrence in an unmitigated form. Dr. Reece of the Local Government Board has collected some facts in proof of this.

Incidence of Illness or Attack-rate in Scarlet Fever.

But turning now to the other aspect of our subject, viz., the rate of incidence or prevalence of illness due to scarlet fever, we have not at present got such satisfactory statistics, although many would still say that the time over which our observations have extended is insufficient to enable us to arrive at any very definite conclusions. It would, however, be more satisfactory if we could show evidence that during the last twenty years, the diminu-

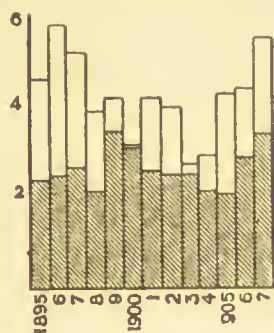


DIAGRAM G.

Shows the London and Surrey Notification Case-rate per 1,000 of the population from 1895, when the returns of the latter county became available. The London columns include the shaded parts, which indicate the heights of the Surrey columns. It is on a plan and scale identical with that of the Surrey Series of Charts, Appendix I, pp. 184-187.

tion of mortality has been accompanied by a corresponding diminution in the proportion of cases notified. Unfortunately this is not the case generally in England, although the chart relating to the County of London suggests that more optimistic views may be taken already (Appendix I, London Chart, p. 180).

Diagram G is here given. It is taken from the already referred to Special Report to the Surrey County Council in 1908. If comparison be made of the London County Chart with this Diagram the first suggestion of optimism from "the stamping out" point of view is weakened. For example, the columns of the years 1905-6-7 fail to

show much improvement on those of 10 years earlier, *i. e.*, 1895-6-7, although the removals to hospital as shown in Diagram H had increased in the interval by about 30 per cent.

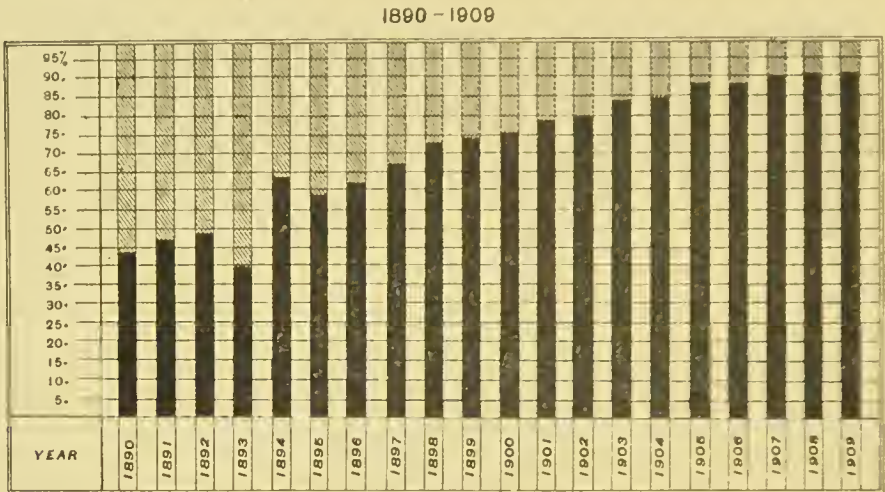


DIAGRAM H.—SCARLET FEVER REMOVALS.

Diagram H shows the steadily increasing proportion of notified cases of scarlet fever in the Metropolis removed to the Hospitals of the Asylums Board.

The Surrey Districts Charts. (See Appendix I, pp. 184-187.)

If only we could point to statistical results in respect of the scarlet fever attack-rate resembling and synchronizing with those of the scarlet fever death-rate, then indeed we should be recording a triumph for notification and hospital isolation approaching that which through notification, vaccination and hospital isolation has been secured in epidemic smallpox. But although we cannot do this, it can nevertheless be shown from some district charts that the existence of the hospitals has undoubtedly made a sensible difference in scarlet fever prevalence, which without them would have been distinctly worse.

The rate of incidence has been very carefully estimated from the collated returns of the thirteen years, 1895-1907 of the districts in the administrative county of Surrey. In order to present the facts in a way that will be readily appreciated, tables of statistics illustrated by charts have been prepared to show the prevalence of scarlet fever year by year in the separate districts of that county. The main feature in these returns is, that there is no very obvious correspondence between the hospital isolation and the prevalence of the disease, and that some of the districts, such as Kingston, which have only very partially adopted the system of isolation, do not at first sight appear to have suffered much from that fact when compared with neighbouring districts which have had hospitals as going concerns during the whole of the thirteen years under review.

Naturally one would expect that there were other circumstances to account for this, as for example, better hygienic conditions, differing "age-distribution," remoteness from urban population, or more efficient sanitary and Public Health administration in one district than another. But after exhaustive examination it is impossible, on such grounds alone, to explain the differences that exist.

It is some few years ago now that Dr. George Wilson, LL.D., F.R.S.E., of Warwick, and Dr. Killick Millard advanced new opinions on certain aspects of our subject; and it may here be mentioned that since then there has been a great deal of discussion on the whole question involved. The writer thought it well to examine the facts relating to the administrative county of Surrey independently, and for that purpose he had the advantage of having associated with him Dr. John Williamson, to whom great credit is due for the painstaking way in which he has gone into the facts and figures which furnish the basis of the series of charts given in Appendix

I, which deals with the comparative incidence of scarlet fever in the various districts of Surrey.

Generally speaking, somewhat Less Scarlet Fever in a District with Isolation Accommodation than in Districts without.

Now, taking the district charts separately, or in groups, it has been impossible to extract from them such marked evidence of the effect of the hospitals from a preventive point of view as one might have been led to expect, and which, as a fact, the writer, for one, did expect, when he gave evidence in support of their establishment, first of all at Mortlake in 1888, and then afterwards at Ottershaw in 1892, or again, when the Cuddington and other hospitals were created a little later.

But—to repeat—although the view then taken was no doubt too sanguine, we are in a position to show that illness without hospitals would have been more extensive than it has been. Indeed, it would be difficult to conceive that such has not been the case, for though there are undoubtedly certain disadvantages in the hospital system, the advantage, as may be seen from Dr. Williamson's valuable observations, on the whole outweighs the disadvantage.

Disadvantages in the Hospital System

We will now proceed to discuss the causes and conditions which have detracted from the good that was expected from the notification and isolation hospital system. There are drawbacks in the hospital system itself which are already well recognized. They arise from two causes. First of all the errors in diagnosis; and together with these cases there have to be considered those of mixed infection, *i. e.*, cases admitted while suffering from one

fever and in the process of incubating another. Secondly, there is the occurrence of so-called "return cases."¹ These two causes together are the source of what may be comprehensively called the "infectious hospital trouble," for they are liable to give rise to cases of cross infection and the equally serious discredit of septic infection.

¹ "*Return Cases*" of *Scarlet Fever and Diphtheria*.—The best way to explain what is meant by the term "return cases," is to quote from the Schedule of Inquiries issued by the Incorporated Society of Medical Officers of Health. Copies of this Schedule are freely obtained by medical officers or hospital and sanitary authorities, on application to the honorary secretaries of the Society at 1, Upper Montague Street, Russell Square, London, W.C.

The term "return cases" includes any case occurring in the same house or elsewhere within a period of not less than 24 hours, or not more than 28 days, from, and after, the release from isolation of the first person, whether at home or in hospital, which is apparently traceable to the patient so released; but schedules should be filled up for all cases so occurring, whether so-called "return cases" or not.

The table of inquiries relating to scarlet fever hospital cases is very complete. It is arranged for a full record of particulars as affecting the patient, including the date of onset and the last date on which any of the following symptoms were traceable:—

- (a) Discharge from the ears.
- (b) Discharge from the nose.
- (c) Eruption round mouth, nostrils or ears.
- (d) Enlarged glands of neck.
- (e) A sore throat during convalescence.
- (f) Desquamation (Peeling).

Then follow particulars as to disinfection and the method of the discharge of the patient from hospital. This latter is most important, as it is believed now that the suitable preparation of the patient for discharge may go far to prevent recrudescence of infectivity.

The further section of the table is intended for a record of the history of the supposed infecting patient after leaving hospital, including an account of the character and extent of contact between

- (a) The supposed infecting patient, and
- (b) The infected patient.

There is a second table for scarlet fever home-treated cases, as it is considered possible that the conditions, which by recrudescence of infectivity make an infecting patient, may arise independently of hospital surroundings, the symptoms being, in fact, part of the natural history of the disease. From Dr. Williamson's figures, however, it would appear that this, which may be termed a natural tendency of scarlet fever development, is rare. Still, the mere existence of the potentiality is very significant as showing that this feature of scarlet fever is developed rather than created by hospital circumstances.

As regards the first, the errors in diagnosis, it appears almost inevitable that in some cases which occur the persons are believed to be suffering from scarlet fever and are sent into a hospital by mistake. Even in the very best administered hospitals and the very best administered districts, such accidents do happen, and we must bear in mind that in some of our hospitals, especially the smallest, there is great difficulty in making provision which would reduce the risks attending this kind of error to its minimum. This points to the necessity of greater care in diagnosis before the step is taken of sending the case to the hospital. It also indicates the responsibility that is incurred in sending the very mild cases, especially those where the characteristic rash and the sore throat have already disappeared, into hospital.

Cases of probable mixed infection should never be admitted to an isolation hospital except under special conditions which obviate the risk of cross infection. In short, the principle of selection of cases for admission to hospitals needs to be recognized and insisted on at the present day.

As regards the "return cases," the Surrey charts show precisely how far they counteract the good of the hospital isolation system. The conclusions that are to be drawn from these observations are that some further means must certainly be tried for doing away with the risk of taking back the illness from the hospital to the home. The subject is one chiefly of hospital administration, that being the main factor which determines the occurrence of these most troublesome cases. But we must not expect too much in the way of exemption, because even in hospitals which have lately been visited, and which are perfect models of administration, medical officers have not been entirely able to get rid of this great objection. The writer, however, thinks that all hospital authorities in a county should report to the Medical

Officers of Health of both the County and District all "return cases," and he would further add that all hospital authorities should publish medical reports annually upon the results of their system, as is done by the Tolworth Joint Hospital Board.

*Why the Advantage of Hospital Isolation is not more
Marked.*

But these drawbacks are not alone enough to account for the disappointing result. The important point that has been arrived at from the close study which Dr. Williamson has carried out with the writer, is, that in a very large proportion of cases, notification arrives too late, that is to say, with the present mild type of illness, an outbreak will often have occurred in a house and all the members of the household have really become affected before notification takes place. There lies the crux of the whole difficulty. The illness has now become so mild that a doctor is not called in at once; infection of other children has taken place not only at home, but also very likely at the school, before notification takes place and before hospital isolation is resorted to. Particular attention is drawn to Charts *e* and *f*, pp. 197 and 198, Appendix II, relating to the Epsom-Dorking District in the Surrey Series. The tall column which stands to the left of the thick black line in each chart represents the large amount of mischief, in the infection of the household, which has already taken place before either notification or removal of the patient. This important point has, the writer believes, not till now been demonstrated.

It is, in short, to a failure, if it may be so called, of the notification system that the incomplete success of hospital isolation is in large measure due (see the instructive Reports and Special Paper by Dr. Porter, Medical Officer of Health for Reigate).

It is, probably, the change of the type of scarlet fever that is mainly responsible for a state of things that at first sight appears to be anomalous. The writer says probably the *main* reason, because the mild case is now, owing to the facilities for locomotion and the vastly increased occasions of child aggregation at schools, etc., far more liable than in days of yore to spread illness.

In a subsequent chapter under the heading of Carrier and Missed Cases, we shall have to resume the consideration of future preventive measures as applied to both scarlet fever and diphtheria. But in the meanwhile it is desirable to devote an intervening chapter to the separate consideration of the Etiology of Diphtheria and the history of preventive measures in England.

CHAPTER V

DIPHThERIA.

THE ETIOLOGY OF DIPHThERIA—HISTORY OF PREVENTIVE MEASURES IN ENGLAND—INVESTIGATION OF THE NATURAL HISTORY OF DISEASE.

IN the "Appreciation" of Sir Edwin Chadwick, reference was made to his great influence, exercised as it was at a time when municipal cleanliness was almost unknown, and when Asiatic cholera visitations were, in consequence, not infrequent. Works of water supply, drainage and sewerage, even in large towns, had still to be introduced and developed. In those times the diagnosis of disease, the nomenclature and registration of deaths, were carried out on a very much less perfect system than what now generally obtains. Much confusion took place in consequence in the records of fever prevalence. This confusion did not apply only to the typhus, typhoid and "continued" fever group, but also to scarlet fever and diphtheria. Thus we are hardly in a position to compare rates of mortality of late years with those of times when the fatal illness was indifferently named and the natural history of its causation unrevealed. The distinctions in the clinical manifestations of typhus and typhoid, as well as the essential differences in the causation of the several other infectious diseases were elucidated in the early days of Sir William Jenner and his contemporaries.

Early Views on Sewer Emanations and Disease Production.

About this period of our sanitary history there came into operation unexpected influences in disease causation. For it happened that drainage systems, which had been recommended as a panacea for sanitary evils of all kinds (having at the outset been imperfectly devised), were found to possess, in their inception, serious drawbacks. Sewer air or "sewer gas," as it was called, was generated in imperfectly constructed sewers and main drains, and the house conveniences being generally "indoor structures" instead of "outdoor structures," this noxious agent escaping into, or being drawn into, dwellings through water-closets, soil pipes, sink and other drains, either caused or spread disease of more than one kind. The most common illness produced in this way was unquestionably a kind of putrid sore throat, with swelling of the glands of the neck and other signs of what was comprehensively—and in popular language—termed "blood poisoning." Not only was the "septic sore throat," as it would, now that we are more discriminate in our language, be termed at the present day (and which is still by no means rarely produced by putrefactive filth and its emanations), attributed to "sewer gas" in dwellings, but a whole train of other evils were strongly held to follow exposure to this more or less dangerous nuisance. About thirty-five years ago among the troubles attributed directly to sewer gas and filth emanations was diphtheria, the preventive history of which we are now reviewing. So widespread, indeed, was the belief in the drain origin of diphtheria that, given an outbreak of this disease, it would seem in those days as if no other conclusion *could* have been arrived at than that the drainage was somehow at fault: *for did not the very existence of the disease itself prove it to be so?* However, there were plausible arguments for

maintaining that belief. Insufficient and faulty drainage of dwellings and towns was then the rule rather than the exception, and anything which hastened improvement was in the main likely to be beneficial. Some of us, however, protested that, as Medical Officers of Health, our first duty was to ascertain the causes of the origin and spread of infectious disease and to advise practical measures for its prevention and control. We further maintained that this custom of blaming the drains or methods of sewage disposal whenever diphtheria occurred, not only sometimes led to unnecessary expenditure, but was harmful in other more important ways. It really impeded research by diverting from their proper channel the thought and energies of medical officers of health.

Fortunately, there are always in the profession gentlemen who can speak and work on the subject of preventive medicine with high authority and perfect independence. Such a one was our former President of the Royal College of Physicians, the venerable and beloved Sir Samuel Wilks, F.R.S. It was he who interposed in our discussions during the latter part of the eighties and the early nineties. In a powerful letter addressed to the leading organs of medical opinion he deprecated that spirit of easy acquiescence in what had come to be an accepted doctrine by medical practitioners generally, and he urged that wholesome scepticism in a matter of this kind was more likely to be helpful in the end.

By degrees broader and more enlightened views prevailed. The assumption that close connection existed between diphtheria and filth proved to be erroneous. Attention, no longer concentrated on the drains, became directed elsewhere, *e. g.*, to kindred affections in the lower animals. Indeed, at the present day the occurrence of diphtheria in a dwelling or school is nothing more than a reason for making sure that there are no serious drainage

defects in or about the building or premises. This is, of course, done as a matter of routine in all inquiries relating to health and sanitation, but in reporting on the probable cause of an outbreak the attention of the trained medical observer is now-a-days directed to more important matters than that of discovering some possible escape of "gas" of one kind or another.

Sanitary and Social Conditions affecting the Growth and Spread of Diphtheria.

Before leaving the subject of House Sanitation and its connection with diphtheria, the writer would recall a saying of a great physician who was also a medical officer of health—Dr. Bristowe, F.R.S. He used to say that dampness of dwellings was more closely connected with ill-health than any other structural condition. Those who have had a long experience of housing conditions among the population generally, of both town and country, will probably be of opinion that the broad-minded official to whom we have just referred was really expressing to us a great generalization when he spoke the words now quoted.

It must further be remembered that although we are living in what may be called a "Bacterial" age, our attention must not be wholly riveted on the seeds of disease. Sir Dyce Duckworth urges us to think less of the *seeds* and more of the *soil*, using that word to denote the human system in which the seeds exist or into which they are received. Dampness of dwellings and the earth affects the body in a way that renders it susceptible to illness of various kinds. In some of these the *causa causans* may be a microbe, but that microbe, for all we know to the contrary, may be generally prevalent, though only operative under certain depressed conditions of the body.

In this connection we may further recall the observations of two authorities, viz., the late Dr. Airey of the Local Government Board and the late Dr. Kelly, Medical

Officer of Health for a large combined district in Sussex. The one based a theory as to the prevalence of diphtheria on the tops of hills on its germ origin only. The other wrote reports (which never received the attention they deserved) tending to show that in country districts, where diphtheria at that period prevailed more than in towns, the damp feet of the children (who often had to walk a distance to school over wet mud and clay) would account for their increased liability to sore throats and genuine diphtheria.

Etiological Observations.

The Medical Department of the Local Government Board, during the long period to which we are now referring—say between 1875 and 1894—were enabled to make some important additions to our knowledge of the etiology of diphtheria. It was during those years that epidemics were studied and discoveries made which have already proved of great practical value, and which are likely to affect administration to an even wider extent in the future. The works of the late Sir Richard Thorne-Thorne, F.R.S., and Sir William Power, F.R.S., are here referred to. They were chiefly in connection with the milk origin of diphtheria (as well as scarlet fever) and the association of both these diseases (1) with a *malady of the cow herself*, and (2) with *school influence* as an important factor in the production and spread of these two diseases. Nor were these etiological investigations confined to the central department, for, despite their other pressing avocations, valuable scientific observations were contributed on the origin and means of spread of diphtheria during these years by Dr. Michael Taylor, Dr. George Turner of Portsmouth, Hertfordshire and the Transvaal, Dr. Matthew Algernon Adams of Maidstone, Dr. Alfred Ashby of Grantham and now of Reading, Dr. Niven of Oldham and now of Manchester, and several others.

The Contagiousness of Diphtheria.

During this period, notwithstanding the predominance of the drain theory of diphtheria origin, recognition of the infectiousness of diphtheria was growing in strength. It was in the year 1887 that—after a visit to New York, where the system of municipal hospital isolation of diphtheria was already in operation—the writer moved for the admission of diphtheria cases to the metropolitan rate-supported hospitals. In his speech as a member of the Metropolitan Asylums Board in November of that year, 1887, he quoted the American experience of the benefit of the system of hospital isolation. At the present time, twenty-four years later, it will, he thinks, be admitted that, whatever may be said about scarlet fever, the advantages that have been derived by the isolation of diphtheria are indisputable.

Here it should be mentioned that Dr. Snell, the Medical Officer of Health for Coventry, has recently made an exceedingly interesting and valuable report, which may be strongly recommended for perusal. At the same time, for reasons to be presently given, it does not in the main affect other conclusions arrived at as to the value of hospital isolation.

The Geographical Distribution of Diphtheria.

Let us further, before leaving the etiological questions relating to diphtheria prevention, draw attention to the importance of the study of the disease from the point of view of its geographical distribution. It is a subject which should be very fascinating to the scientific worker in etiology. One aspect of it, viz., the constantly shifting geographical distribution of diphtheria in England (judged by rates of mortality), furnished the main topic of the addresses the writer, as delegate of the Royal College of Physicians, gave before the International Congresses of Hygiene both in London in 1891 and at Budapest in 1894.

THE BUDAPEST CONGRESS ON HYGIENE AND
DEMOGRAPHY, 1894.*The Treatment and Prevention of Diphtheria by Bacterial
Methods.*

We now come to the eventful year when the labours of the leaders in Bacteriology seemed about to be crowned with success, and when the serum treatment of disease, with all its great possibilities, impressed the whole medical world and marked an epoch in the preventive history of diphtheria. It was in 1894 that the great Hygiene Congress took place at Budapest. Loeffler was there, and so were Roux and his colleagues from the Pasteur Institute of Paris. It was pre-eminently an occasion for a "lifting of the veil," for a congress of this kind is devoted to Hygiene in its broadest sense, and it is by no means exclusively confined to doctors and experts, its members comprising a fair proportion of those directly concerned in Public Health administration, who represent the *Peoples* of different countries. The system of bacterial diagnosis and antitoxin treatment was explained by its originators, illustrations being afforded of its triumphant success. It is beyond dispute that the great advance in medical knowledge announced at that time has already, even now, led to some wonderful results, and that it may become far more widely applicable. But some of us were inclined to be sceptical about all that was promised in 1894 as regards prevention, and it rather seems now that there was some ground for scepticism. There has been no "vanishing" of the diphtheria death-rate under the influence of the bacterial system, though recent figures seem to demand further consideration. We have still to penetrate the mysteries of the *origin* of diphtheria and its obscure relationship to scarlet fever.

A few weeks after the Congress, Professor Sims

Woodhead gave a memorable address before the Royal Institution on the probable future of the bacterial system of diphtheria prevention. He began by exhibiting figures relating to mortality statistics showing how unsatisfactory was the then existing state of affairs, and how we might expect a complete change for the better as regards the diphtheria death-rate. It will now be our task to review the subject of prevention after the consideration of such data as are available.

We proceed to exhibit the official returns of the diphtheria death-rates from the year 1883 onwards, including the very last record, viz., that for 1909, which has been kindly supplied by Dr. Stevenson, the Superintendent of our National Department of Vital Statistics.

TABLE A.

DIPHTHERIA.

*Death-rates per Million of the Population of England and Wales,
1883-1894.*

Three-year periods.	Diphtheria.	Croup.	Diphtheria and croup.
1883	158	172	330
1884	186	176	362
1885	164	156	320
Average	169	168	337
1886	149	134	283
1887	160	143	303
1888	171	129	300
Average	160	135	295
1889	189	114	303
1890	179	109	288
1891	173	91	264
Average	180	105	285
1892	222	76	298
1893	318	71	389
1894	291	58	349
Average	277	68	345

TABLE B.
DIPHTHERIA.

*Death-rates per Million of the Population of England and Wales,
1895-1906.*

Three-year periods.	Diphtheria.	Croup.	Diphtheria and croup.
1895	259	54	313
1896	291	51	342
1897	246	35	281
Average	265	47	312
1898	243	27	270
1899	292	32	324
1900	290	26	316
Average	275	28	303
1901	273	25	298
1902	236	18	254
1903	182	13	195
Average	230	19	249
1904	170	14	184
1905	160	14	174
1906	177	13	190
Average	169	14	183

These figures speak for themselves. The twelve years after Budapest, compared with the twelve years before, do not exhibit any such marked change as we were led to expect in the autumn of 1894. What took place was a substantial fall of 17 per cent. in the diphtheria mortality of England and Wales. But that diminution cannot be ascribed wholly to the effect of the bacterial system, for other influences have been at work. Sanitation in its broader sense may have had some share in bringing about this result. So too, increased attention to the maladies of the cow, and consequent improvement of the milk supply generally, would have produced some effect. Certainly increased attention on the part of sanitary and

education authorities to school hygiene must also be credited with a fair share in a reduction of the death-rate from an illness which has long been classed among the preventable diseases. At the same time it must be recognized that in diphtheria, as in scarlet fever, school attendance is an adverse influence in affording opportunities of infection.

TABLE C.
DIPHTHERIA.

<i>Death-rates per Million of the Population of England and Wales.</i>			
Three-year periods.	Diphtheria.	Croup.	Diphtheria and croup.
1907	164	11	175
1908	157	9	166
1909	146	7	153
Average	156	9	165

The record of the last three years is much more favourable. The diminution of the diphtheria death-rate recorded by the Registrar General in the three years 1907-9, viz., 37 per cent. on that of the preceding twelve years' period, is sufficiently notable immediately to arrest attention. Here, indeed, we have an example of an epidemic fluctuation which might easily have led to misconception if by chance the antitoxin order had come into operation in 1906 instead of 1910.

With regard to the antitoxin treatment in skilful hands the writer, in common with others of his profession, is profoundly impressed with its great value. At this place he invites attention to the Diagrams and Chart in Appendix II, facing p. 198, of Sir Shirley Murphy, with notes of his own. These diagrams relate to the mortality and notifications of diphtheria in the County of London. As in the case of the diagrams relating to scarlet fever, elsewhere given, they suggest a much more favourable view than seems warranted by the National Statistics.

Investigation of the Natural History of Infectious Disease.

Before leaving this aspect of our subject the writer would plead for more attention to the natural history

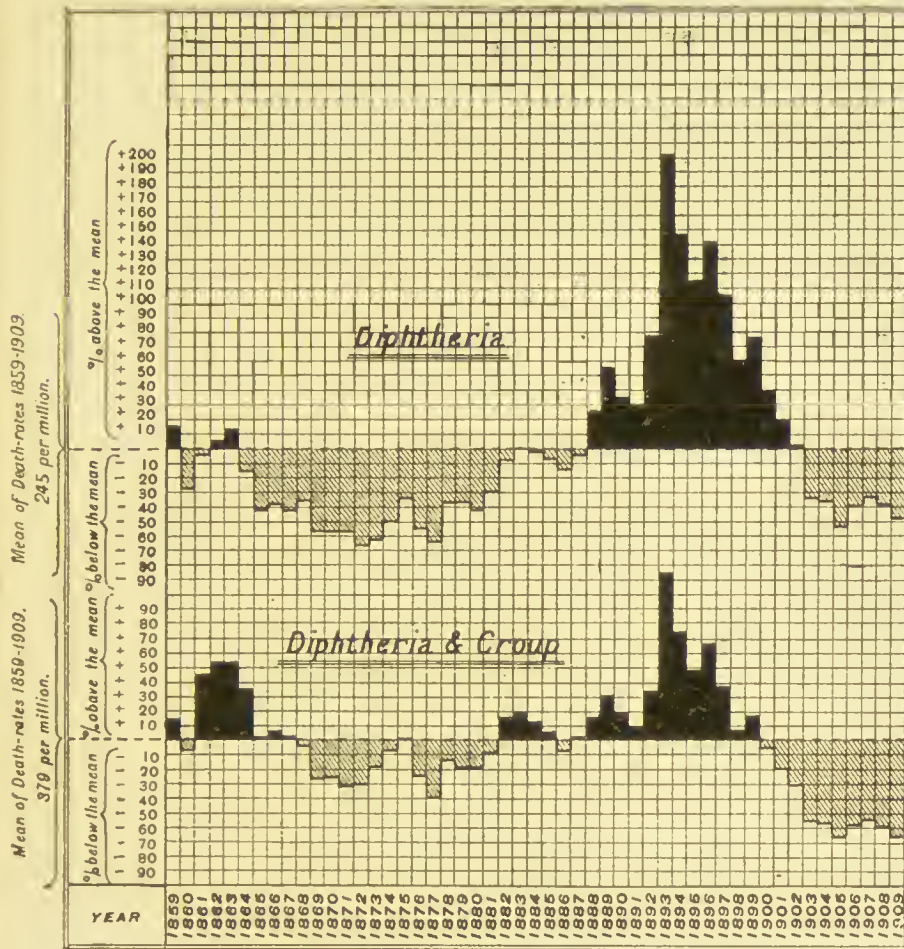


DIAGRAM I.—DIPHTHERIA DEATH-RATES.

London Series. Showing fluctuations and diminution of diphtheria death-rates coincident with hospital and antitoxin treatment.

of the so-called preventable diseases on the part of those who direct research. Laboratory research work is most essential, but in order to enable public authorities to derive full advantage therefrom, it is necessary that

1890 - 1909

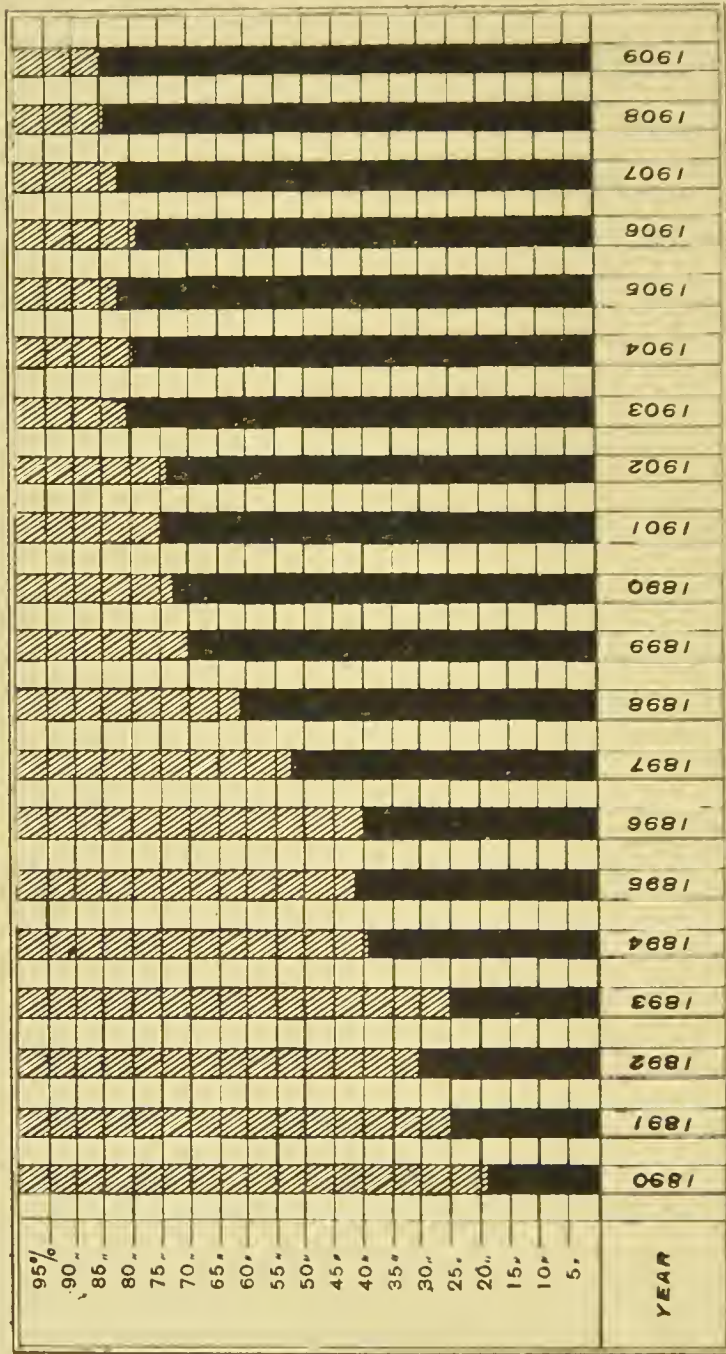


DIAGRAM J.—DIPHTHERIA HOSPITAL REMOVALS.

Showing the proportion of notified cases removed to the hospitals of the Metropolitan Asylums Board.

it should be accompanied by, and co-ordinated with, collective investigation, which is equally entitled to be considered scientific. The President of the Epidemiological Society in 1894-1896, the present Sir Shirley Murphy, on entering his period of office, gave an address in which he reviewed the work of such eminent observers as Professor Hirsh, Dr. Charles Creighton, Messrs. Buehan and Mitchell, Herr Korosi, Dr. Astley Gresswell, Dr. Arthur Ransome, F.R.S., with Professor Delepine, Professor Marshall Ward, Dr. Longstaff, and others, some of whose names have already been mentioned. Such work greatly needs encouragement and support in the best interests of the public.

As Diphtheria will be the subject of the next series of Chadwick lectures we need not dwell on this aspect of the subject at present.

CHAPTER VI

SCARLET FEVER AND DIPHThERIA

THE "CARRIER" OR "MISSED" CASES OF SCARLET
FEVER AND DIPHThERIA—PREVENTIVE MEASURES—
THE SELECTION OF CASES FOR HOSPITAL ISOLATION.

THE defects of our present system of dealing with scarlet fever have been already indicated. They arise partly from difficulties of diagnosis, admission of cases of mixed infection, the dangers of cross infection¹ and the development of "return cases." These difficulties belong more especially to hospital administration. But they do not by any means constitute the main trouble that has to be faced. This arises outside the hospital. In London, and many populous districts elsewhere, it concerns the Department of Public Health, which is not always in close touch with hospital administration. Sometimes

¹ The following figures, taken from the last report of the late Dr. Chantelier of the Lodge Road Hospital, Birmingham, show the extent of co-existing diseases at a large isolation hospital.

Diphtheria and scarlet fever	.	.	.	.	16
Diphtheria and measles	.	.	.	.	1
Diphtheria and whooping-cough	.	.	.	.	4
Diphtheria and varicella	.	.	.	.	2

Second infection contracted in hospital.

46 Diphtheria	developed	scarlet fever.
6 Diphtheria	„	measles.
4 Scarlet fever	„	measles.
2 Scarlet fever	„	varicella
17 Diphtheria	„	scarlet fever and measles.
4 Diphtheria	„	scarlet fever and whooping-cough.
4 Diphtheria	„	scarlet fever and varicella.

in the country it is in close touch by the fact that the Medical Officer of Health directly controls the administration of the hospital. But whether it is so or not there are two essential points that we have to bear in mind when we discuss the urgent question of needed improvement. We have to consider—

Firstly, the hitherto elusive “carrier” or “missed” cases, and how it may be possible to cope with the complications to which they give rise. In this chapter we may consider scarlet fever and diphtheria together. For though in the case of the latter bacterial diagnosis comes to our aid, the problem to be solved in both cases is essentially the same.

Secondly, the question of selection of cases for treatment at hospitals. Is this feasible, and if so on what principles can it be carried out?

Missed Cases and Carriers of Infection in both Scarlet Fever and Diphtheria.

This is the part of our subject which has nearly equal concern with both scarlet fever and diphtheria. But before framing any suggestions or provisional recommendations for the improvement of our present system of medical organization we must refer to Chapter IV on scarlet fever, which contains the “finding” that there was only rather less scarlet fever in the “hospital provided” than in “non-hospital provided” districts. Having regard to the expense entailed by the hospital treatment of cases of scarlet fever, this “finding” was unsatisfactory, and it became necessary to ascertain the reasons of such a comparative want of success. The writer now proceeds to give these reasons, and to explain them by the series of rough diagrams with notes attached given in Appendix II relating to the Epsom and Dorking combined district.

Some of these show how the advantages of hospital

isolation are to some extent neutralized by the occurrence of "return cases"; while others make it only too plain that under our existing system of medical organization notification comes too late to be of much use, the scarlatinal infection having taken hold of the family before the doctor is called in. Hospital isolation does not therefore have a fair chance.

An examination of the Notes and Diagrams, especially the last two of the series, Home Cases (*e*), and Hospital Cases (*f*), will show the nature of the investigation and how the results have been arrived at.

Briefly stated, the position as shown by the investigation is as follows. The case-rate per house is seen to be 1.46 under hospital treatment and 1.56 under home treatment for the whole series; the advantage when cottages only are compared is practically in the same proportion, viz., 1.49 as against 1.61. Sixty per cent. of the secondary cases were already infected before notification or removal; from the end of the first week until the end of the sixth week the effect of removal is evident; it continues to a slight extent for the next four weeks, but is then considerably discounted by the high proportion of cases following on the return of the patient from hospital.

The advantage of early diagnosis is shown by an analysis of the dates of removal or notification in houses in which single and multiple cases respectively occurred. As regards removal in 548 houses in which single cases only occurred, 93 per cent. of the patients were removed within a week from the date of attack; in 194 houses in which multiple cases occurred, 73 per cent. of the first patients were removed within the week. As regards notification of home-treated cases, in 514 houses in which single cases only occurred, 82 per cent. of the cases were notified within a week of attack; in 227 houses in which multiple cases occurred, 70 per cent. of the first patients were notified within the week.

It is plain, therefore, from the figures and charts that an earlier discovery or recognition of cases is necessary to make hospital isolation fairly effective.

Early Diagnosis and Selection of Cases for Hospital Isolation.

First then as regards carrier cases. They concern the question of the best method of preventive treatment in scarlet fever and diphtheria even more than is the case with typhoid and smallpox. But we shall find ourselves again discussing similar troubles in connection with the two last-mentioned diseases, for has not the problem of typhoid prevention become complicated with its carrier, while smallpox in its mildest forms is apt to resemble chicken-pox and skin affections in a way that is liable to lead to serious consequences. The missed or carrier case constitutes at present an administrative difficulty in all four of our notifiable and hospital-treated diseases.

In all cases, therefore, the perfection of methods of early diagnosis is the prime necessity. Whether the diagnosis be (1) by the skilled medical observer, or (2) by the expert in the laboratory, or (3) by the qualified assistant of the Medical Officer of Health, it is plainly a wise expenditure of public money which provides means so essential to a complete preventive system.

The value and importance of correct diagnosis (if only from the point of view of immediate economy) being established, it would follow that, except under very special circumstances, this could not safely be left to nurses and health visitors, however well trained, without close expert supervision. The provision of expert assistance will be discussed in the last chapter. But assuming it to be made, we have then the further question arising

as to what is to be done for discovered cases or carriers under various circumstances, and how far it may be possible to provide means of isolation elsewhere than at their homes for cases that become recognized, if not officially notified. Here we come to the second principal requirement, viz., the necessity of selection of cases suitable for removal to and treatment at hospital. Already it is, in the opinion of many experienced Medical Officers of Health, very questionable whether the amount of bed accommodation given up to the isolation of these two diseases (to the exclusion of other diseases that also call for hospital treatment) does not exceed legitimate demands. If it does, the selection of cases in which most advantage may be obtained by removal to hospital must be left far more to the judgment and decision of the Medical Officer of Health than hitherto. Many examples in the case of diphtheria as well as scarlet fever might be quoted as showing the necessity for change in our administrative system in this respect. If such change were to take place, the expressions "good isolaters" and "poor isolaters," as applied to sanitary authorities in their present signification by Dr. Kaye, would then fall into disuse. Some important points in the whole preventive system are dealt with in the rest of the chapter.

Efficient Sanitary Medical Organization.

This is essential for carrying out any preventive system. It has improved materially, as every one knows, in certain respects. But, considering that it is thirty-six years since the Public Health Act, 1875, came into operation, the improvement is not at all adequate in view of the importance now attached to the functions of a Medical Officer of Health in a system which may, even at the present day, be termed one of "State medicine." It is

impossible now to discuss fully and impartially the various questions that arise for consideration under this head. This may be done elsewhere. In the meanwhile the salient points may be briefly mentioned. (1) There are the nature of the office, its tenure and remuneration. (2) There is the subject of the relative importance and responsibility of the offices of various grades. There are some of these offices which can be undertaken by qualified medical men, or by medical women, without long official experience; while there are others which require long and varied experience of all kinds. The emoluments in the latter case might be expected to be in a sense proportionate to the services required. This is not always the case.

Isolation Hospital Supervision.

Passing on then to another section of our subject, as regards hospital supervision and the standardizing of hospital arrangements, there is much that requires to be done, and that very soon. The Metropolis should properly lead the way. It has already done so in certain directions. It has the immediate advantage of the high official advice of the Local Government Board: Dr. Newsholme and Sir Arthur Downes are both gentlemen of wide experience on hospital matters. Among the members of the Metropolitan Asylums (Hospitals) Board is Professor W. R. Smith, who has freely given much of his valuable time to the public service, and its medical official staff includes such authorities on fevers as Dr. Caiger, F.R.C.P., Dr. Goodall, Dr. McCombie and others. The great provincial towns, where co-ordination is less difficult, are in some ways more advanced than London, and many valuable lessons are to be learnt from their experience.

In the counties there has been a good deal of activity

during the past twenty years, especially in the populous counties of the North and the Midlands; but in the remainder of England, including the principality of Wales, much still remains to be done, especially in respect of organization and co-ordination.

In England and Wales there are said to be at present some 700 infectious hospitals, for the management of which there are about 1,000 hospital medical officers and 15,000 nurses. But the very fact that these figures only represent a conjecture is of itself an indication of the need for official inspection and supervision.

*Modern Developments of the Isolation System.*¹

This would seem to be the proper place to refer to the innovations which are now being made by the introduction of different systems at Tolworth and Beddington Hospitals, of Surrey, the Plaistow Hospital, Essex, and the Eastern and South-Western Hospitals, Metropolitan Asylums Board, the Bagthorpe Hospital, Nottingham, and many others. The object of these different systems is to enable the several infectious diseases in which isolation is beneficial to be treated at the same time in one hospital, *i. e.*, under one administration. Such arrangements seem specially suited to town hospitals. In some counties, however, with a fair number of isolation hospitals it would, if it were possible, be preferable if different hospitals could be used for different diseases, *e. g.*, one for measles, another for scarlet fever, a third for diphtheria, and so on. Our recognized authorities on these subjects are Dr. Caiger, of the Stockwell Hospital,

¹ The writer would draw attention to an address by Dr. Crookshank to the Home Counties Branch of the Society of Medical Officers of Health, in which he dwells on the special importance of isolation in the cases of a "rising" epidemic, *i. e.*, when the infectivity is potent.

On the general subject of the selection of cases for hospital isolation, Dr. Pierce of Guildford and Dr. Hanslow Brind of the Chertsey District combination have had special experience.

Dr. Goodall of the Homerton Hospital, Dr. Biernaeki of the Plaistow Hospital, and Dr. Boobbyer of Nottingham.

County Nursing Associations and Bureaus of Information.

One of the most useful institutions of late years has been the formation of central county nursing associations. The subject has been taken up with zeal and energy, tempered with discretion, by distinguished ladies, who have no difficulty in securing the assistance of prominent county administrators. It is hoped that before long every county in the United Kingdom will have its county nursing association. The object of such an association is to train and provide a sufficient number of nurses of all kinds for service in their areas. Among the many valuable aids that such an association may give to the Public Health service, would be that of furnishing a bureau of information with regard to the nurses required at different times at the infectious isolation hospitals of the area. Epidemics seldom visit the several localities of a wide county at one time. Nurses may have little to do at a hospital in one quarter of a county while they are badly wanted at the same time in another quarter of the same county. As a bureau of information and exchange the association seems to be naturally indicated as the proper authority under the County Council to effect an organization which would tend alike to economy and efficiency.

Length of Stay of Patients in Hospital.

This is a matter which it may be respectfully suggested seems to require the early attention of the Local Government Board. A treatise on the subject by Dr. Turner of the Metropolitan Asylums Board has been published in *Public Health*, the excellent Journal of the

Society of Medical Officers of Health, which is now edited by Dr. McCleary. The question is one which has several times been referred to and seems to need prompt attention. Obviously the stay in hospital should be as brief as possible consistent with the proper medical treatment of the case and the reasonable safety of the public. If at one hospital (town or country) patients recovered from scarlet fever should habitually be discharged at the end of four or five weeks, and at other hospitals, not till seven or eight weeks, this shows the need of standardization.

Home Treatment of Scarlet Fever and Diphtheria—Inunction and Use of Antitoxin (Provided Free).

The length of stay at hospitals together with a liability to "return" cases are some of the chief objections to the extension of the isolation hospital system at the present day with regard to these two diseases. On the other hand, the danger of retaining cases of scarlet fever at home, which has been already referred to, may be, it is hoped by some, to a large extent modified by a system of inunction. This system, associated with the name of Dr. Curgenvin, has been practised for several years at the Barnardo Homes and elsewhere by its enthusiastic advocate, Dr. Milne.¹ The writer is greatly obliged to Dr. Milne for the facilities he has already afforded him for studying this subject, and he recommends his book for perusal. Having further had the opportunity of making some inquiry and talking with experienced colleagues on the subject, he thinks he rightly expresses their opinions as well as his own when he says that it is a practice or system that requires further careful scientific trial.

¹ For a judicial review of this system as practised up to 1895 see a paper by Dr. Joseph Priestley, *Epidem. Soc. Trans.*, Vol. XIV.

As regards diphtheria, great things are expected from the operation of the Order recently issued by the Local Government Board, which will further facilitate the use of antitoxin in the homes of patients suffering from this disease.

School Influence.

It certainly must be to the advantage of the community generally if missed or carrier cases can be ascertained and

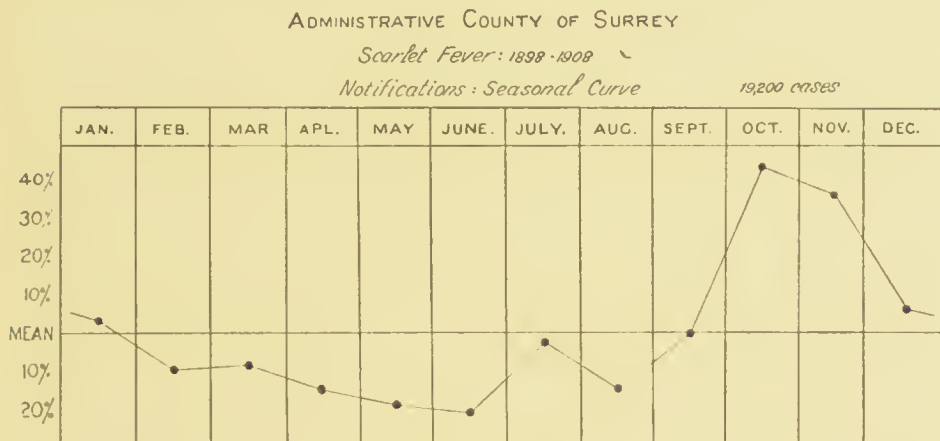


DIAGRAM K.

Showing the drop in the annual notification rate during the month of August.

kept away from school and other places of public resort. To bring this about the public will have to be educated as to the danger of the very mild cases. Very great advantages must arise out of the system of school inspection under the various education committees. For it seems unnecessary at the present time to insist on the principle that compulsory school attendance implies moral obligations on both education and public health authorities to ascertain the existence of, and to efficiently provide for, infectious illness among school children. Nottingham was the first to adopt a scheme for systematic information of infectious diseases to its education authority. Reference

may be here made to the volume of evidence given before the Liverpool Committee in 1882.¹

The chief incidence of scarlet fever and of diphtheria is upon children of school age, and in this connection we must not omit to notice that the Medical Officer of the County of London has for many years recorded a diminution in the amount of notifications of these diseases at the time when the holidays took place. See Diagram K, previous page.

Amount of Hospital Accommodation required.

To sum up what has now been said, responsible officials are almost all agreed that the hospitals have done much good in both scarlet fever and diphtheria by reducing mortality. We further believe that as regards the question of prevalence, they have undoubtedly produced good effect, especially in the poorest homes, but the reason for their not having produced better results is that the diagnosis, especially of scarlet fever, does not take place sufficiently soon. In other words, the doctor is called in too late to prevent the infection of other patients, and in addition the spread of illness occurs through unrecognized and carrier cases.

Medical Officers of Health are also nearly all agreed as to its being essential that hospital accommodation should be afforded for cases at provision shops, lodging houses and the like. Furthermore, it is fully recognized that anything like perfect isolation of scarlet fever is impracticable in the homes of poor people, and that some of these cases are better in hospitals. In the present state of medical and public opinion, the necessity for

¹ A copy of this volume is in the possession of Dr. Hope, the Medical Officer of Health for Liverpool. It contains the writer's evidence in full as given to the Committee on October 3, 1882. It illustrates the hardship which then existed of the school inspectors compelling the attendance of children at school where they ran additional and avoidable risks of infection.

a certain amount of scarlet fever hospital accommodation must be generally admitted. But when we come to the question of how far it is practicable at present to isolate at hospitals all children affected with scarlet fever in its mildest forms at the public expense, we are confronted with the problem of the hitherto elusive "missed cases." How in the first instance are these to be discovered with the existing system of public health administration? If discovered in increased numbers, as they may be, it certainly must be to the advantage of the community generally that when ascertained they should be kept away from school and other places of public resort. This subject is further treated in the concluding chapter of this book.

The Surrey County Council may be congratulated that through the County Education Committee the system of early school notification of all suspicious cases of infectious disease to the district Medical Officer of Health is now fairly in operation, having been started by the Education Medical Officer no less than five years ago. It is very satisfactory to record that district medical officers of health have been ready to co-operate and have found the system useful. Its extension is now seen to be most desirable, for it is clear that the only way of coping with the spread of scarlet fever and diphtheria is by systematic personal examination of suspicious cases by medical men in order to discover the *earliest* symptoms of the disease. But although "personal examination of suspicious cases" is now referred to as having been initiated at schools in Surrey, it should be further explained that the general and complete carrying out of such examinations on some comprehensive plan at home as well as at school would hardly be possible even there at present.

CHAPTER VII

TYPHOID (ENTERIC AND CONTINUED FEVER)

DECREASED PREVALENCE—TYPHOID CAUSATION—INFLUENCE OF RAINFALL—MILK TYPHOID—SHELLFISH—TYPHOID INCIDENCE IN DURHAM COUNTY—EXCREMENT DISPOSAL—CONTACTS AND CARRIERS—THE VALUE OF HOSPITAL TREATMENT.

“WHEN the notification of this preventable disease—typhoid—was first made systematic it was urged that the primary advantages to be derived from the compulsory system would not be confined to the immediate work of dealing with known sources and channels of infection. For, valuable as such action must always be, it was plain that in the course of years the advantages of the system might be extended by collective investigation and comparison of conditions attending the prevalence, whether in epidemic form or in the endemic form of sporadic outbreaks. The system once fairly established, sanitary authorities might be enabled not only to gain therefrom a better idea of the proportionate importance of any known factor in the causation of the disease, but also to better realize the necessity for directing attention to the large number of cases occurring year by year, the origin of which is unexplained.”

It was in this way that a report in 1907 commenced on several years' experience in the generally salubrious county of Surrey, where typhoid prevalence has markedly declined of late years.

*Decreased Prevalence of Typhoid.*¹

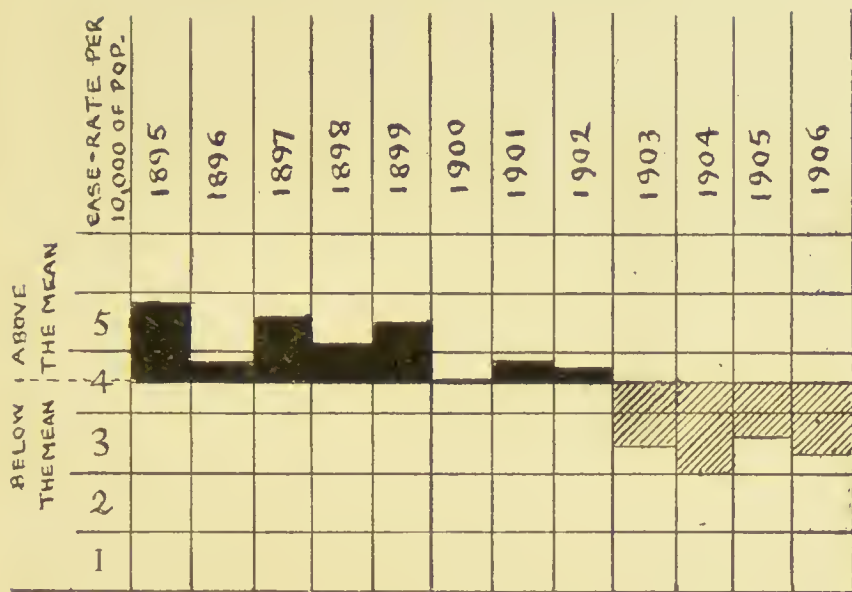


DIAGRAM L.

Surrey Series. Diagram showing the typhoid (enteric and continued fever) case-rate per 10,000 of the population in each of the twelve years 1895-1906.

The decline in the typhoid death-rate throughout almost all England is one of the most satisfactory evidences of the efficacy of sanitation. This is well shown by maps prepared by Dr. Bulstrode.² But unlike typhus, typhoid or enteric fever has not been “stamped out.” It still persists, and some are of the opinion that its persistence

¹ The great reduction in the death-rate from typhoid is, without doubt, mainly due to markedly reduced prevalence. We must not, however, omit to take notice of a mitigated severity in the type of the disease, and the testimony thereon of experienced physicians. Dr. Sidney Phillips said in his Harveian address, “the type of typhoid fever has considerably altered: the profuse diarrhoea, high temperature, tendency to coma vigil, delirium and the typhoid state, which gave so much difficulty in distinguishing between typhus and typhoid fever, were much more common twenty-five years ago than they are now, when constipation is as common as diarrhoea, the pyrexia often of a low range and the mental condition clear throughout.”

² *Local Gov. Board Reports.*

has been in a measure due to the mistaken views as to its etiology and epidemiology. Its prevalence in any town or district was for long generally taken to be a sign that there was something wrong with the water supply, with the result that inquiry was very frequently limited to that subject. The last published map, showing the rates of mortality from typhoid in the several counties of England, is that by Dr. Franklin Parsons, of the Local Government Board.¹

The reduction of typhoid concurrently with general sanitary improvements, not only here but abroad, has in fact been so marked during the last decennial periods that it has come to be regarded in certain quarters rather as a negligible quantity so far as the etiological study of the disease is concerned. It seemed a striking fact to the writer when on making some inquiries during the early part of September of the year 1906 at Munich, he found that all observations on the problem of typhoid causation appeared to have ceased. That city in former times, when typhoid was exceedingly prevalent, became the seat of the exact study of the relation of the disease to water supply and "ground water levels." Since the decline of epidemics, the observations instituted by the former Chief Medical Officer, von Pettenkofer, seem to have been discontinued in Bavaria, although the questions connected therewith cannot be considered to have been solved. This neglect cannot, however, be said to be general, as indeed is shown by the attention given of recent years to the subject through the Medical Department of our Local Government Board. In the Indian part of the Empire much success has attended the antityphoid campaign. Abroad also the interest taken in the further preventability of the disease is evident from the numerous observations on the natural history of typhoid which have been and are now being made, especially in Ger-

¹ *Trans. Epidem. Soc.*

many and America. Some of these are clinical rather than etiological studies and have been associated with laboratory investigations. They have to do with contacts, carriers and foods as well as water-borne infection—using the term water-borne in a wide sense, that is to say as applying to typhoid prevalence caused by infected shellfish. Of these comparatively recently recognized methods of epidemic diffusion we shall have more to say presently.

But before we part with a comparatively ancient aspect of the typhoid causation problem, it should be recorded that it is not altogether lost sight of in the United Kingdom, for a few months ago the writer received a letter from Sir Charles Cameron, whose name is familiar to us in England and whom we are delighted to hear of as one of the most popular men in Ireland. This is what he says :—

“ In Dublin the incidence of enteric fever—10,000 cases dealt with in all—was formerly 50 per cent. greater in the districts on gravel than in the districts on the stiff boulder clay. . . .

“ I attribute this to the greater area in the soil where the gravel was, for the development of bacterial life. The ground water rose and fell, its rest level being about eighteen feet from the surface of the ground, whereas in the boulder clay it was within seven feet from the surface. I inferred, therefore, that there was a connection between the nature of the soil and the incidence of enteric fever.”

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Water-borne Typhoid.

But, to put it shortly, the teaching of a former generation was that typhoid was not directly infectious, but was indirectly so by polluted soil or by polluted water,

the latter being frequently polluted through the soil. That belief was practically universal in England twenty years ago.

The old investigations of the Privy Council Medical Department, and afterwards of the Local Government Board, were scientifically conducted, and the reports were conclusive as regards the causation of the occasional *sudden* epidemics (fulminating outbreaks), which attracted so much notice that no wonder the impression they created in this country has been deep and lasting. The impression that typhoid was mainly of water-borne origin has been maintained and even strengthened from time to time of late years by such occurrences as those at Worthing, Maidstone, *Lincoln*,¹ and Basingstoke. But these occurrences, which now only affect the total mortality from typhoid to the extent of a very minute fraction, really do no more than prove that there are *still* conditions attaching, especially to some underground sources of water supply which (although the water of the locality is generally pure), may, under certain circumstances, suddenly render it dangerous.

The experience of the South African campaign and the frequent references thereto during the first few years of this century have done much to revive the impression that typhoid is commonly water-borne. But as to that sad experience of our army abroad, whatever the facts may be, the observations thereon have obviously little application at home. The difference in the circumstances is that apart from climatic conditions, water supplies are in war, not only casually, but continually polluted specifically, and in that way help to cause a heavy gross mortality. In our country the total mortality is under 1 per 10,000 population and

¹ The Lincoln epidemic was not connected with underground sources of water supply, neither was that of the Tees Valley, which some of the best authorities considered to be a typical water-borne epidemic.

the conditions of water supply are of course in every way wholly different to those of the Transvaal in 1900.

Discussion on Typhoid Causation.

Some two years back, in opening a discussion on typhoid at the Royal Society of Medicine, the writer quoted the famous Sir William Gull. His words, uttered in 1873, were to the effect that the water-borne doctrine of typhoid causation was a very good working hypothesis, but nothing more. But great as was the authority that men were wont to attach at that time to the utterances of one who shared with Sir William Jenner the credit of having saved the life of the late King Edward when attacked with typhoid, the concise statement of this physician was by no means accepted by those members of the medical profession who could speak with special authority.

The rising school of epidemiologists had amongst its founders experts who, by their exact studies of outbreaks of epidemics, by their clear reasoning thereon, and by the scientific character of their researches and brilliant reports, had succeeded during the previous ten years, *i. e.*, since 1863, in enlightening the people as to the causation of cholera and typhoid in this country. They had been able, in fact, to show definitely, with mathematical precision, how epidemics of these diseases, which had formerly been referred to vague influences of one kind or another, rose and spread. To some such a statement as that referred to appeared both unappreciative and misleading, for it was naturally argued that, given workers of sufficient acumen and industry, every considerable outbreak of these diseases would be found traceable to water supplies, and that even the cases that occurred in detached or sporadic form would in some way or other be connected with the same source,

as, for example, through milk infected by polluted water.

But, looking back from our present standpoint, may we not well ask whether Gull's assertion was very far wrong even thirty or forty years ago? Sir William emphasized the fact that the water-borne view was "a good working hypothesis," and so it undoubtedly proved to be in after years, both at home and abroad. Nay, further, may we not even say that it is still a good working hypothesis at the present day, when we think of the great work that is being done by the Metropolitan Water Board under the scientific guidance of Dr. Houston in improving the condition of the water drawn from the river Thames, and when we reflect that there still remain sources of public water supply constantly exposed to danger, and liable to be delivered to consumers in an unpurified condition?

But the subject we have to consider is much wider, for it is nothing less than the whole problem of typhoid causation at the present day, and the relative importance of different measures with a view to its prevention. In order to discuss this fairly, it is essential to reduce the water-carriage factor to its proper proportions. In doing this a few considerations seem to be of cardinal importance. They may be taken in chronological order.

In the first place, going back to the decennial period, 1873 to 1882, how many of us who were working in the large towns of England (away from the metropolis) can be said to have succeeded in tracing outbreaks to polluted water supplies? On the other hand, were there not a few who, working in large towns where typhoid incidence recurred annually every autumn—more especially in certain quarters where the abominable midden system and other air- and food-polluting agents existed—could not fail to note at the same time, and in the same localities, that the public water supply was pure and abundant,

being, in fact, delivered on the constant system, and, moreover, free from suspicion of contamination in its passage from the source to the standpipe or tap.

Again, taking the next decade, 1883 to 1892, when lake water supplies had been and were being utilized for the use of large cities, and water of the highest organic purity was being furnished to communities, including the dwellers in slums, the fact that typhoid persistently continued to recur in the autumn furnished an even more striking manifestation of the fact that freedom from typhoid is only to a limited extent dependent on the purity of public water supplies. For instance, there are the experiences of the large towns of the North. Do they not clearly indicate that water-borne infection cannot possibly be a principal factor in the causation of typhoid? Indeed, by the time we reach 1893, it seems to have become quite manifest that a polluted water supply was not by any means the sole or general means of conveyance of the disease, and attention then became directed to such agencies as dust and flies, and, above all, to the direct effect of polluted or unwholesome foods.

Coming now to the period since then—viz., the fifteen years from 1893 to 1907 inclusive—we are furnished with negative evidence of even a stronger character against the views with which we started. By this time notification had become universal in operation, and medical officers had become increasingly devoted to their special work, so that in a very large proportion of cases of illness inquiries were made at once, and pains were taken to ascertain the facts of the circumstances attending the date of attack—*i. e.*, some two or three weeks before the onset of illness.

The writer then proceeded to give the results of his own observations in the County of Surrey, the details of which need not be given at present. They may be summarized by saying that when over 2,000 cases occur—

ring in twelve years had been carefully investigated, it was apparent that only a very small percentage were attributable to the water supply. Further investigation of the kind in other counties (which may or may not have had similar experiences) would be most useful.

His address concluded as follows :—

“ I would not have it supposed from the above statements that I am in the least degree unappreciative of the real danger that exists from water pollution infection at the present moment. The comparatively recent occurrences, especially that at Basingstoke last year, to say nothing of the Maidstone and Worthing epidemics, show us what a real danger the polluted water supply is, and no one who has witnessed, as I have, the effects of such an epidemic as that at Maidstone can doubt for a moment the propriety of urging every reasonable precaution for preserving the purity of water supplies which are actually exposed to contamination. Needless to add that in the case of a water supply derived from a necessarily contaminated source, as is that of the river Thames, we all recognize the paramount necessity for proper means of purification being insisted upon at the present day. Such measures would have obviated the disasters in the Tees valley and at Lincoln. I would go further and say that in certain cases the rules as to subsidence and filtration of river waters should be made compulsory, and the possible risks of water derived from such strata as the chalk formation in populous areas should be dealt with in a much more drastic way now than formerly. Moreover, the experience of such an outbreak as that at Mountain Ash, which attracted so much attention years ago, and has been dwelt upon so frequently by the supporters of the

'water theory,' is one that should never be lost sight of, and the rules for the preservation of water, while in the mains, from possible contamination by insuction of sewage are most important points to be borne in mind.

"But the question before us is not whether reasonable rules should be rigidly applied to the preservation of water supplies from dangerous contamination, and their purification previous to supply, if such contamination have taken place, but whether in the mass of typhoid fever which we have to deal with every year we may not be thinking of the polluted water doctrine too much, to the neglect of other more tangible and immediate sources of mischief."

The above quotations from this address embrace what has to be said with regard to the water theory of typhoid spread and its utter insufficiency to account for the persistence of typhoid prevalence in various parts of the United Kingdom. There were no material criticisms of his remarks, the gist of which has been given. His address was followed by three others. One by Drs. Richards and Brinckner, following up the chalk water supply contamination question, another by Drs. Davies and Hall treating of the risk from carriers, and a third, by far the most important of all our contributions, by Dr. Hamer, that widely read and most thoughtful observer, whose work in practical epidemiology we all admire.¹

¹ Dr. Hamer's contributions to Science and administration have been important and numerous. To mention only a few, there were his reports of twenty years ago on Conditions Determining Susceptibility, for the Local Government Board. On anthrax in London; on enteric fever in London in 1895, 1900, 1903 and 1910; on administration in the East End and other densely populated parts of London; on the operation of by-laws as to houses let as lodgings; on the preparation and sale of food; on the nuisance from flies and vermin; and, again, his report on typhoid in London in 1910. All except the first of these reports were for the L.C.C. In addition he has given us a manual of hygiene, a

Rainfall Records and Typhoid Prevalence—Appendix III.

This section of the chapter is completed by the writer's own observations in the County of Surrey on the relationship of rainfall to typhoid prevalence, *see* Appendix III, p. 200.

A full description of these records and observations appear in the Annual Report for 1906 of the County Medical Officer of Health for Surrey. The rainfall records were collected each month from a number of gentlemen residing in various parts of the county; some in the Surrey portion of the Thames Basin; others in the area of the chalk water supplies; and others, again, in the much less populated area from which water supplies are drawn, chiefly from the greensand hills. Prominent among these contributors were Mr. F. Campbell-Bayard, of Croydon, Hon. Sec. of the Royal Meteorological Society, Mr. Dines, F.R.S., Sir Henry Roseoe, F.R.S., Sir William Vineent, and Lord Ashcombe. These records were shown year by year for the seven years 1900–1906 (inclusive), by light black lines imposed on the thick black charts, which indicate the fluctuations of typhoid prevalence as shown by the corresponding monthly returns of notifications of typhoid throughout the county. It is, perhaps, unnecessary to do more than publish the synopsis or general view of the results of the observations. Briefly stated the results of comparisons are negative on two important points bearing on the question of water-borne typhoid. These are: (1) As regards the large and populous area supplied from the Thames River sources, there is no evidence that by surface contamination after heavy rainfalls, as for example in the year

standard work of reference; several addresses on Pathological and Epidemiological works before the Royal College of Physicians and the Royal Society of Medicine, which exhibit great powers of reasoning combined with a cultivated intelligence and sustained application.

1903, typhoid prevalence was affected; (2) In the parts of the county supplied from the deep wells in the chalk formation there is no evidence that the springs, which rise some three or four months after the occurrence of continued heavy rainfall, are affected in a way that would influence typhoid prevalence.

Milk Typhoid.

Closely connected—some will say too closely connected—with the subject of potable waters comes that of typhoid-infected milk supplies. Some milk typhoid outbreaks or epidemics have been traced to fouling of the milk with drain air (Ballard, Islington); others to infected well water at the farm from which the milk came, and others again have been, as regards origin, unexplained, though the specific infectiousness of the milk may have been conclusively proved by circumstantial evidence. The possibility of the connection of typhoid with a cow malady has been thought of; but as yet there has been no direct evidence of causal relationship. As to the possible causes of unexplained outbreaks in the past, is it unreasonable to suggest that much light is thrown on them by the remarkable discoveries recently made with regard to carriers? As regards the infection of milk the theory has been that the added water consisted of what is euphemistically spoken of as the rinsings of the cans or pails. The milk thus infected has, in quite a considerable number of instances in the last forty years, been absolutely proved to be the vehicle of typhoid. An epidemic which made a great sensation in London was that at Marylebone in 1873. The connection of the epidemic and the milk supply was first detected by Murchison, the famous physician; the tracing of the infection to its source and the explanation of all the apparent anomalies in the distribution of

this widely-spread epidemic were the work of the late Mr. Netten Radcliffe, assisted by Mr. W. H. Power. The peculiar interest in this epidemic arose from the fact that the "consulting doctors'" quarter—the Cavendish Square and Harley Street region—was one of the chief scenes of the mischief. The public water supply could not, on the broad facts of the case, possibly be accused, and the houses were all sealed against infection by the air of the sewers. The writer had good reason to remember this occurrence, for it formed the subject of one of his earliest official reports to the Health Committee of Nottingham. Years afterwards, in 1887, as lecturer on public health at St. Thomas's Hospital, he used this case as one of the best he could give to illustrate the methods of proper scientific epidemiological inquiry.

The Shellfish Origin of Typhoid.

We have to consider a certain class of foods which are largely consumed, viz., oysters, mussels, cockles, etc., and their rôle in typhoid diffusion.

Dr. Bulstrode's volume, issued by the Local Government Board, on *Oyster Culture in relation to Disease*, has been before the public now for about fourteen or fifteen years. During that time there have been some striking occurrences, such as the Winchester Banquet with its fatal results. They remind us of the actual danger from polluted oysters. These tragic events may be few and far between, but they sometimes suffice to produce an unreasoning fear. Oysters as a nourishment for invalids are of great value, and when we know that they come from an unimpeachable source it becomes a matter of duty to recommend their use as food by those who can afford them, and who will derive benefit.

A much larger number of people are affected by the danger similar in kind which attaches to the indiscrim-

inate consumption of uncooked mussels and other cheap shellfish. The report of Dr. Darra Mair of the Local Government Board on the endemic prevalence of typhoid in Belfast, which was at first ascribed to water supply, contains some very remarkable evidence of the part played by shellfish in maintaining the disease, the exemption of the Jewish part of the population being the most striking fact. Of late years fried fish, a cheap popular food, has proved a considerable factor in typhoid diffusion.

Typhoid Incidence in the County of Durham.

In connection with causes of typhoid generally we may now turn to the nineteenth annual report of Dr. Eustace Hill, the able Medical Officer of Health for the County of Durham. There is to be found at pages 22 and 23 evidence as to district incidence and its causes, which speaks for itself. The following is taken *verbatim* from Dr. Hill's report :—

“ In no district during 1909 was enteric fever seriously epidemic, but its incidence was marked particularly in the Easington Rural District and to a less extent in the rural districts of Auckland and Sunderland. In the Easington Rural District it is pointed out that several cases resulted from the eating of watercress taken from polluted streams, while other cases in the township of Stationtown were associated with the disturbance of polluted soil during the making and channelling of a street. In the Sunderland Rural District the disease was especially prevalent in the colliery village of Ryhope, where the disease may be said to be almost endemic, owing, in the opinion of the district Medical Officer of Health, to the large number of insanitary midden

privies and the deplorable condition of the streets and yards. In reference to the prevalence of this disease in Ryhope Dr. Stobo says :—‘ I should like to draw your council’s attention to the fact that typhoid fever is an infectious disease, and that in every house without a water closet and without accommodation for efficient isolation, the case should be removed to hospital. He is not only a danger to the other inmates of the house, but almost as great a danger to his immediate neighbours.’ In the Borough of Stockton cases of this disease were attributed to the eating of infected shellfish and to infected material being carried by dust and flies, and posters were issued pointing out the danger of eating uncooked mussels or other shellfish. Cases occurred in Whickham and in the Chester-le-Street Rural District, which were also attributed to the eating of shellfish. In Blaydon defective drainage is mentioned as the cause of a number of cases which occurred, and in the majority of cases the disease was attributed to such insanitary conditions as foul ashpit privies and polluted subsoil about dwellings, the spread of the disease being assisted by flies and by infected dust during the process of scavenging or by high winds. There was no direct evidence that either the milk or water supplies were responsible for any outbreaks of enteric fever in the county during 1909.

“The highest death-rates from enteric fever occurred in the Easington, Auckland and Sunderland Rural Districts, and in the urban districts of Bishop Auckland, Hebburn and Seaham Harbour. The Medical Officer of Health of Hartlepool points out that in that town, where water closets are universal, not a single case of enteric fever occurred during the whole year, and I have not the slightest doubt

that if the water-carriage system was adopted throughout the county of Durham, our death-rate from enteric fever, which exceeds that of any other county in the country, would be reduced below the low rate now obtaining throughout the country generally."

*Excrement Disposal, Privies, Flies and Dust,
Infection of Foods.*

This would seem to be the proper place to say a few words on this very essential subject. In the writer's early days it was all-important, for, with all due respect to the modern pathologist, the association of cholera and typhoid with excremental filth was too close to allow of any mistake as to what really caused typhoid.¹ Indeed, it led the great Murchison to name the last-mentioned disease pythogenic fever.

Conservancy systems of sewage disposal were common in the seventies, and existed in their very worst form in the case of streets of "back to back" houses, where the abominable old privy midden, with the inhumanly degrading occupation it involved, was the only sanitary convenience. These arrangements were vastly improved by the substitution of tubs or ash closets. But with the perfection of the comparatively efficient and less expensive water-carriage apparatus of modern times the water closet is bound to supersede the dry ash closet, and the necessity of improving outfall sewage works, so as to bring them up to a modern standard of bacteriological efficiency, will be forced upon all small borough and district councils throughout the United Kingdom by the continual attentions of the higher authorities.

¹ The Report of Dr. Henry Stevens to the Local Government Board on Typhoid in the early seventies at Over Darwen in Lancashire revealed a state of things so shocking as to be hardly credible at the present day

Dr. Newsholme in his address on infantile mortality at Brighton, in September 1910, gave some very striking figures showing the superiority of the water-carriage system of excrement removal over all conservancy systems from a purely public health point of view. The epidemic diarrhœa of infants is evidently an excremental disease, and it is said to have been greatly reduced at Leicester by the substitution of the water-carriage system carried out on the best modern lines.

Contacts and Carriers.

We come now to the subject of contacts and carriers and to the extent to which they contribute to the maintenance of typhoid. So general was the belief in the filth origin of typhoid when Simon wrote his classical report on filth diseases in the early seventies that lecturers in medicine often spoke of typhoid as not being at all infectious in the way that typhus was always reckoned to be. With more prolonged experience that teaching has become considerably modified. Typhoid is now held to be infectious, in the same way, but not at all to the same degree as typhus.

In the course of the discussion on the addresses already referred to, Dr. Andrewes of St. Bartholomew's stated two years ago that as sanitary officer to St. Bartholomew's Hospital, it was his duty to make inquiry into all cases of infective disease which arose within its walls. Among those was a certain proportion of cases of typhoid. During the last fifteen years the number would work out at an average of two or three nurses per year attacked by typhoid. Much more rarely a patient was attacked—perhaps four or five in the last fifteen years. The interest of these cases is that they were practically all contact cases, for the cases arose in medical wards, not in the surgical. There had been, in his experi-

ence, one or two cases of surgical nurses being attacked, but in one, at least, of these an unsuspected case of typhoid had been present in the ward.

The Value of Hospital Treatment in Typhoid.

Our isolation hospitals are indeed valuable institutions for the suppression of both endemic and epidemic typhoid. The writer is strongly of opinion that hospital isolation in cases of this disease should be promoted, where persons are attacked in crowded or insanitary homes. It is under these circumstances that direct infection frequently takes place.

CHAPTER VIII

EPIDEMIC SMALLPOX

PART I

PREVENTION AND CONTROL MAINLY BY VACCINATION

LET us in this chapter avoid as far as possible entering into the polemics of what is sometimes termed the vaccination question, *i. e.*, the controversy as to the policy of compulsory vaccination. The writer would also beg to disclaim any intention of speaking too dogmatically either about an epidemic disease the vagaries of which are as strange as those of smallpox ; or, on the other hand, about measures for its prevention and control for which one or another party has claimed a predominant influence. Having been compelled from time to time to be at close quarters with smallpox, and having both heard and seen so much of vaccination almost from the time that it was first made compulsory, he feels less and less inclined to write in an *ex cathedra* spirit. He would rather invite consideration of this difficult problem of smallpox prevention and control from a standpoint not usually adopted, either on the one hand by members of his profession, or, on the other hand, by politicians, who with rare exceptions appear to speak on very partial information. It is to the smallpox isolation hospital and all the medical organization connected therewith that attention is now chiefly directed.

The Epidemic of 1901-3.

We may appropriately commence by referring to the last epidemic in this country, viz., that of 1901-3, and to the lessons which appear to be derived therefrom. There has never been any comprehensive Government report on that epidemic. The writer, therefore, will quote very freely from a report by himself presented to the Surrey County Council at the end of 1902. The report was as near an approach to a comprehensive statement as could be made at the time without information from the central department.

During the months of August and September, 1901, rumours of epidemic smallpox began to prevail in London. There had been sporadic cases of the disease earlier in the year—indeed, two such had been under notice in the western part of Surrey, and were referred to in the County Medical Officer's monthly reports for June and July, 1901. But at this season, the late summer or early autumn, outbreaks were occasionally marked by virulence of type, with power of spreading, and they occurred, moreover, under circumstances which naturally gave rise to considerable anxiety among those who have made this dreaded disease their special study. For fifteen years the kingdom generally, and the metropolis in particular, had been enjoying an immunity from smallpox entirely without precedent since the date at which fairly reliable statistics became available, viz., in 1838. The occurrence at that time (1838) of an epidemic outburst, and the repetition of such an outburst about thirty-three years later, when the terrible epidemic of 1871 occurred, led some experts to think that the time had again arrived when in 1901 it might be expected that the disease would take on those malignant and dangerously infective qualities which it has a tendency

to manifest from time to time. Some are inclined to believe that this recurrence is cyclical or definitely periodical, the major epidemics or pandemics being separated by intervals of about thirty years. The fact that vaccination—which is the mainstay in the prevention of smallpox, as it always has been for a century or more—is in its universal application much more the subject of question now than formerly, added to the anxiety of all responsible officials. How, indeed, could it be otherwise, seeing that the direct use and appliance of the chief means of control of one of the most infectious diseases were becoming impaired? The position of affairs, as regards the adoption of this great prophylactic, is pretty generally known. The amount of primary vaccination default had become much greater of late years, owing to the growth of the anti-vaccination agitation during the absence of smallpox. This fact of itself indicated, as it does now, a special danger in the face of a rising epidemic. Another very important factor in the situation was the increasing facility with which those who were more or less opposed to vaccination have been able to have their own way, with the unfortunate result that the operation in many instances meant little more than a name. Efficient vaccination—that is to say, the performance of the operation so as to afford fair primary protection against smallpox—means three or four proper vesicles, with resulting scars of a definite size. This is the recognized standard of efficient or successful vaccination. But the production of the “one small spot,” which seemed often to satisfy operators as well as parents, became a source of public danger both on account of the illusory protection afforded, and because it indirectly but materially helped to diminish faith in vaccination.

Under all these circumstances, therefore—the period for epidemic prevalence having recurred, vaccination being opposed and partially evaded, re-vaccination being

at the same time almost wholly neglected—it was not surprising that prominent officials, especially those under whose care our national systematic measures of prevention are conducted, should have pronounced the conditions to be alarming.

The agitation about the Vaccination Acts, and the fact that an entirely new factor in vaccination had come into operation only two or three years before, were sufficient to cause uneasiness. But, in addition, the situation during the epidemic 1901–3 was complicated by other circumstances. The London system of Public Health administration had just been undergoing a change. With the formation of new boroughs and large administrative areas, the old system of consulting practitioners as medical officers of health, which had lasted so long, was only now giving place to the modern system of specialist officials. New systems were emphatically on their trial.

On the other hand, it is only fair to mention at this stage that this complicated problem presented itself differently to several local responsible officials. The views of this class were largely influenced by the value and importance they were prepared to attach to the already well-organized methods of many important local sanitary authorities. This organization had then reached a high state of development as compared with its rudimentary condition when the epidemic of 1871 occurred. It was natural that those who had been so much concerned in building it up should have had faith in themselves and their authorities. Nevertheless, as is evident from the papers of the time, in 1901 as in 1871, in the face of a threatened smallpox epidemic comparatively little stress was laid on the efficacy of the preventive measures directed by local authorities apart from the universal adoption of recent vaccination. Indeed, it sometimes appeared that smallpox was officially

regarded as being "in the air," an illness against which no measures are likely to avail beyond those of individual precaution. Possibly the tendency to take this pessimistic view may have been partly the result of the dissociation of vaccination work from that of ordinary Public Health administration. Be this as it may, it was freely asserted in 1901 that we might expect a recurrence of the experience of 1871, when as many as 7,912 persons died in the Metropolis, the population of which at that time did not much exceed 3,250,000 or about a million less than in 1901.

Panic Vaccination.

How far the panic which followed this announcement, and which was increased by the daily announcement of the number of cases in the public prints, assisted in actually limiting the spread of the epidemic, it is at present impossible to say. Its effect among the well-to-do classes was sufficiently obvious. But what were the facts as regards the great mass of the population? To what extent was re-vaccination adopted? Was it adopted by those who required it most for protection, and was it efficiently performed? These are questions it would be difficult to answer, for we know of old how erratic and uncertain is this "panic re-vaccination."

Here the writer would quote the late Dr. Seaton's opinion, expressed in no uncertain way in his classical work on vaccination published in 1868. He used to emphatically declare that panic vaccination could never be relied on to check an epidemic. These were his words:—

"My experience of re-vaccination, as it is at present conducted in England, has shown me that, except by an intelligent few, it is only practised at times when smallpox is prevalent and people under

the influence of panic. It is then very generally done with very little selection, and more according to the fears of individuals than according to the judgment of the practitioner. It is squandered accordingly where it is not wanted at all, or is of very little moment, and is very frequently omitted in the very cases in which it is most urgently necessary."—*Handbook of Vaccination*, p. 277. Macmillan & Co., 1868.

The soundness of his opinion was remarkably illustrated during the epidemic in the city of Montreal in 1885. The writer of this volume wrote in *The Times* of November and December 1886 about this epidemic. The first of his letters (written as the Lecturer at St. Thomas's Hospital) evoked replies from Mr. Tebb, Secretary of the Anti-vaccination Society, and a mysterious person to whose contributions was attached the letter "R."

Since that time the principle on which many sanitary authorities act in face of a rising epidemic is changed. In fact, ever since the adoption of the Notification Act, it has been to secure re-vaccination *when and where it is most wanted*, a very different matter to securing a total immune population as in Germany or Japan. The vaccination and the Public Health or sanitary authorities being separate, has been one of the reasons why the modern system has been more slowly developed than it might otherwise have been. Throughout England and Wales vaccination work is apart from that of the sanitary authorities. London's administration is altogether exceptional in other important respects. This is mainly due to the fact that it is made up of a congeries of large towns with imperfect co-ordination of official staffs. In the metropolitan area the work of the isolation hospitals, being under the Asylums Board, is quite separate.

The published reports of the Metropolitan Asylums Board show how ineffectual were the appeals in 1901 to the people generally to adopt re-vaccination voluntarily, and at the same time how much more might have been done to secure the vaccination or re-vaccination of those comparatively few people whose risks of infection were perhaps a thousand times greater than those incurred by the general public. In 1902 the Asylums Board drew attention to the large number of visitors to the ships and other smallpox hospitals, among whom the precautions as regards vaccination or re-vaccination seemed very inadequate. It was about that same time, when the epidemic was at its height, that the counties near London were suffering by an importation of infection by the carpenters and other workmen who had been employed by the hundred in rapidly making the extensive additions to the accommodation which it was thought might be wanted down the river, near Dartford. As to the vaccination or re-vaccination of these workmen, no special pains appear to have been taken. It is true that there did not exist then, and there do not even now exist, powers to compel the vaccination of those who *must* be brought within the sphere and risk of smallpox. But whatever the views of different authorities may be in the highly controversial question of compulsory vaccination and re-vaccination as applied to the whole population, it is surely a sensible plan, and sound economy in every way, to expend every effort in securing the full amount of protection for the comparatively small number of people, viz., the certain and probable "contacts."

We shall have to return to this subject presently. In the meanwhile, to complete these general remarks, it may be repeated that the panic which prevailed in the winter months was partly the result of conditions which had not been reckoned with before. It was furthermore stimulated by the vague apprehension

arising from our imperfect knowledge of the natural laws in obedience to which epidemics tend to reappear after a lapse of years, and, certainly in the case of smallpox, to prevail with maximum intensity during the winter months.

Epidemic Periods or Cycles.

The opinion that a period of thirty years marks the interval between the times at which smallpox acquires a special malignancy and power of spreading (such as characterized the contagion of 1871, and have been manifested again since) is based partly on analogy with other epidemic diseases, of which measles is a type, and which are the subject of what are called major and minor waves of prevalence.¹ It rests partly also on observation of what has actually occurred in this country since the death certification and registration system has been properly in operation. The material for generalization is, however, rather scanty. Comparison with other countries is liable to prove misleading in this respect. The diagram of smallpox in London (see p. 119) does not help us very far in testing the opinion. If we go back to periods before 1838 we encounter the confusion arising from imperfect certification and registration. If, on the other hand, we are limited to the period since that date, we have only the 1871 experience itself, coupled with that of 1901, to guide us. Now, the pandemic of thirty years ago followed on the Franco-German war, and the savage characteristics of that outbreak were associated by some leading authorities with the pestilence-breeding circumstances of such a campaign. This has always been regarded as a possible explanation. If admitted, it obviously weakens, though it does not destroy, the long cycle theory. No such theory had been advanced

¹ This is a subject on which Dr. Whitelegge delivered the Milroy Lectures before the Royal College of Physicians in 1903.

in 1871; in fact, that epidemic came as a complete surprise to the epidemiologists of that time. The appearance of the 1901 epidemic was at first thought to be a sign of the correctness of the theory. But before attempting to decide this point the conclusion of the epidemic period had to be awaited in order to arrive at a proper sense of proportion of what the epidemic really amounted to.

The Smallpox Epidemic Charts.

We now have the means of comparison. They are given diagrammatically in the charts, Appendix IV, which relate to the vast population of London and the contiguous counties. As regards England and Wales generally, the epidemic spent its force in the great provincial centres of population (as it did in the 1871-3 period) some months later than in the metropolitan area, *i. e.*, Greater London and its immediate surroundings.

When, in the autumn of 1901, the alarm was sounded that we were on the eve of a great pandemic outburst similar to that of 1871, there were some at least who protested that such an event was unlikely. Indeed, they were justified by subsequent events in this counter assertion. To them it seemed very unlikely that the minor epidemics which occurred in the decade following the great epidemic of 1871 would be surpassed.

The subject of long cyclical periods is, of course, in large measure hypothetical. But we know that, as regards season, other things being equal, smallpox is a disease much more likely to spread in the winter than in the summer. We also know that it tends to recur with exceptional virulence at irregular intervals. Furthermore, there are grounds for believing that from time to time, through some mysterious agency, it is apt to become more dangerous, not only in regard to the virulence of attacks, but also in power of spreading by contact, and

LONDON

SMALL-POX

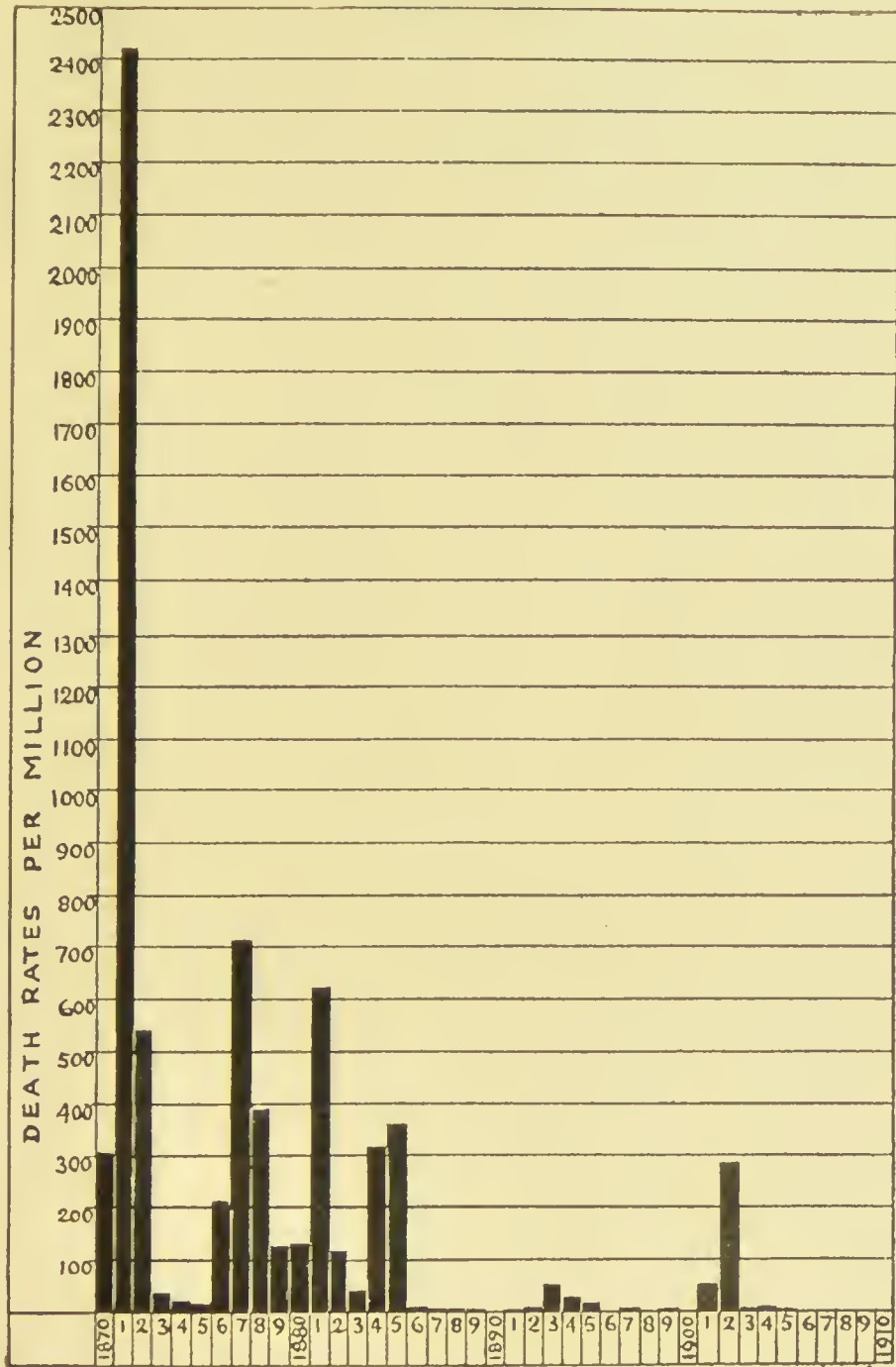


Diagram M from Appendix IV. Surrey Series.
Showing the death-rate per million persons living, for the years 1870-1910.

perhaps, as the former Chief Medical Officer, Sir William Power, thought possible, by its ability to infect others at varying distances through the atmosphere. The air is always, of course, more or less a medium of communication, but we usually think of a "smallpox striking distance" as measured by feet or yards, whereas according to the theory which found acceptance at Whitehall (chiefly during the medical officership of the late Sir Richard Thorne-Thorne) measurements were by furlongs and even miles.

To sum up what has now been said, it is possible, perhaps even probable, that the period the country went through in 1901-3 was one of a potentially severe epidemic, and that the epidemic was cut short by the preventive measures to be presently described. No one can say when the next epidemic will occur. Indeed, the only means of forecasting the extent of smallpox invasions is by a careful consideration of the extent to which preventive measures are available, or likely to be applied in such a way as to ensure success. The most essential means of prevention is, of course, vaccination *properly applied*.

Vaccination.

As we are discussing the subject of smallpox prevention by modern methods, it is sufficient for present purposes to state once more that vaccination, efficiently performed, is considered by the medical profession generally to confer a large amount of security against fatal smallpox, and that re-vaccination, efficiently and recently performed, renders the protection, even against slight attack, complete. Furthermore, it must be granted that vaccination is essential to us in preventing the spread of smallpox, and that, in fact, without it we should be in a comparatively helpless position.

In this country the long-continued freedom of late years from epidemic smallpox has been frequently com-

mented on. In a sense this freedom is primarily due to vaccination. It is so because without vaccination and re-vaccination we could not have enjoyed this good fortune, for the simple reason that no smallpox isolation hospital could have been staffed. This consideration naturally leads us to the question of the day, viz., "Cordons of Protection" and "Contact Re-vaccination" v. "Universal Re-vaccination."

We should now, therefore, proceed to a description of our present system of dealing with smallpox in the earlier stages of an outbreak or epidemic, but before doing so it may be appropriate to call special attention to the arrangements which have been developed by Dr. Blaxall under the Local Government Board for the immediate provision of glycerinated calf lymph on almost any scale that might be required by vaccination or Public Health authorities. It is to the researches and pathological discoveries of Dr. Monckton Copeman, F.R.S., of the Local Government Board, that we are indebted for this lymph manufacture. To him and to Dr. Allan Green, as well as to the patient investigators of the bacteriology or micro-pathology of smallpox and vaccination, we all, and especially those who have to deal with smallpox at close quarters, owe a debt of gratitude. The writer had hoped to be able to give, or refer to, a description of the Government lymph establishment at Colindale Avenue, the Hyde, Cricklewood, N.W. Dr. Blaxall, however, informs him that this is impossible at present, but that it may be published in the next Government report.

PART II

BY VACCINATION, MEDICAL ORGANIZATION AND
ISOLATION

Vaccination is held by the medical profession generally to be the proper preventive measure against smallpox, and it is certainly the most essential measure. But to be a protection against epidemics, not only must the vaccination of infants be provided for, but the systematic re-vaccination of children and a second re-vaccination in adult life would have to be made compulsory for the whole population. Indeed, many experts at the present time would go further, and maintain that to avoid attacks of any sort when smallpox threatens, quite recent vaccination is desirable. Any statutory measure to compel repeated vaccinations of the whole population of Great Britain must, however, now be regarded as outside the sphere of practical politics. The partly compulsory vaccination of infants, which Dr. Edward Cator Seaton did so much to promote before as well as after he became a public servant, was a great success, so far as the protection of infants and children was concerned. It almost extinguished smallpox amongst the very young, and it produced a very marked reduction of total mortality from this disease, but the mortality of the disease was partly transferred to those of adult life. With the wonderful fall which took place at the "under five years of age" period there synchronized an actual rise in the mortality at the later periods of life. When the late Dr. Seaton's career as medical officer of the Local Government Board closed, in 1879, it had already (then more than thirty years ago) become apparent that auxiliary measures of protection for the population were necessary.¹

¹ Edward Cator Seaton (son of Edward Seaton, a retired naval surgeon who had settled at Rochester in Kent, and father of Edward Cox Seaton,

The Compulsory Notification System.

It seems hardly credible at the present day that when the epidemic of forty years ago swept over the country there was practically no organization for dealing with initial outbreaks of smallpox. The knowledge of the very existence of this dreaded epidemic disease was most uncertain. The first intimation of its presence in the midst of a large population was by the death register. The sanitary authorities, as then constituted, were often ignorant of the danger until it had already become a serious menace to the public health, there being really no one to officially inform them. The necessity for providing suitable hospital accommodation for the sufferers was, indeed, strongly felt; but the very authorities who had this duty assigned to them were not only entirely without the means of controlling the epidemic, but were ignorant of the extent to which they would be likely to be called on to make provision for sufferers, such sufferers being in the language of the statute "without proper lodging accommodation." Neither had they any competent person to direct measures of prevention. Step by step these conditions became materially altered. A new officer was called into existence by the 1872 Public Health Act, whose specific duty it was to report on the circumstances attending outbreaks or threatened epidemics, and to advise on measures which professional knowledge or experience indicated as likely to be effectual. Fuller powers were given to this end by the later

the writer of this book) was born in 1816 and died in January 1880, just three weeks after his retiring pension as Medical Officer of the Local Government Board had been granted. His life work may be said to have been the promotion of systematic vaccination. In the year 1877, when the writer was Medical Officer of Health for Nottingham, he conferred with his father on the subject of a Notification Clause in an Improvement Bill the council of that town were then promoting. It is due to his memory to record that Dr. Edward Cator Seaton showed interest and sympathy with a movement which opened up fresh possibilities in the prevention and control of smallpox.

Public Health Act of 1875. But the most essential step, and one which excited a great deal of interest among the medical profession, leading, indeed, to very warm controversy, was that which required the notification of such infectious diseases as were sources of danger to the whole community, and in the prevention of which sanitary authorities were primarily concerned. To those who read the daily reports of the numbers of cases notified in epidemic times, and of the measures swiftly taken by the various authorities for limiting the spread of infection, and who at the same time had a knowledge of the pre-existing state of things, the idea of comparing the conditions of 1871 and 1901, without taking into account the radical change effected by the adoption of the notification principle, seemed illogical. It is true this was only a part of "sanitary organization" which included hospital provision, disinfection, prevention of overcrowding, etc.; but it was the most essential part. It is only fair, then, to those pioneer authorities who helped to secure this enactment, to recall the important part they took in bringing about more satisfactory conditions. This improvement in sanitary organization is to be distinctly associated with the enterprising town councils of the midlands and the north of England, as well as that of the city of Edinburgh.

This part of sanitary organization of local sanitary authorities necessitated, of course, the exercise of continuous medical expert knowledge and assistance. Accuracy of diagnosis assumed more and more importance from the standpoint of the patient as well as the public, in proportion to the urgency of the case and the rapidity with which preventive measures could be applied. Further, the circumstances under which small-pox will spread, depending, as it does, at any season, not so much on the ordinary sanitary environment of the sick persons in respect of cleanliness, and even prox-

imity to sufferers, as on the degree of immunity conferred by vaccination on those who are within the immediate sphere and risk of infection, necessitated special arrangements for securing protection. In other words, an independent medical authority to ensure, as far as possible, vaccination or re-vaccination when and where the operation was most essential for preventive purposes. Again, the legitimate susceptibilities of medical practitioners in matters where their professional interests are affected, and the liability to interference with the ordinary relations between doctor and patient, required not only special knowledge and tact, but a freedom from any suspicion of professional rivalry. In short : to provide for all this, to bring the vaccinators and public health officials together, to furnish many other requirements, and generally to smooth away obstacles, has been the chief object in the organization of sanitary authorities, and has by degrees come to be a special duty of the medical officer of health.

Diagnosis of Unsuspected or Missed Cases.

It was very soon perceived that many of the practical difficulties in dealing with initial outbreaks of smallpox would arise from liability to error in distinguishing the various modified forms of the disease. So strongly was this felt that as long ago as 1887 the Royal College of Physicians were moved to promote clinical instruction at smallpox and fever hospitals, and they succeeded in making the hospitals of the Metropolitan Asylums Board, hitherto closed to students, available for that purpose. In order to bring the system into practical operation, it was, of course, necessary to draw up and enforce a complete set of regulations for hospital attendants of all kinds, which had in view the prevention of any possible spread of infection outside the hospitals by the medium of "contacts," as they are now termed.

At the present day, after several years of almost complete absence of smallpox in epidemic form, we read a good deal in medical papers of the risk of cases of mild smallpox becoming mistaken or "missed" and so creating a special danger in a community, particularly at schools where many children are now without the protection of vaccination. Much also is heard of the mild type of smallpox outbreaks which have occurred of late and which tends to increase the liability to error of this kind. All this accentuates the importance of cultivating skill in diagnosis. As an essential means of prevention its value cannot well be over-estimated by public health authorities. In London and in almost all the large towns and populous counties of Great Britain there are to be found medical officers or practitioners who have acquired special experience in the detection of cases of smallpox in their early stages and milder forms of attack.

Protected Cordons and Attention to Contacts.

The next most important step in limiting outbreaks is by the establishment of a cordon of protected persons wherever the infective centre may be. If the sufferer is removed to hospital the attendants and nurses must all be efficiently vaccinated or re-vaccinated. Without such a precaution no smallpox hospital could be worked. Where the sufferer cannot be removed to hospital immediate attention to the vaccination or re-vaccination of the other inmates of the dwelling, or those in any way likely to come in contact with infection, is a matter of the utmost importance. Indeed, it is impossible to exaggerate the value of these preventive measures to those who are specially exposed to risk. Everything depends on their being properly secured.

Some of the most triumphant examples of the kind of preventive work now described may be taken from cases where early diagnosis has been arrived at under circum-

stances of difficulty, and where, with infinite pains, every individual liable to be affected has been seen to, and all legitimate official pressure used to secure vaccination as soon as possible. The watching the cases throughout is no small addition to the work of the medical officer of health; but there is no direction in which he can more usefully employ his special knowledge.

Dr. Newsholme, the principal medical officer of the Local Government Board, in his last report, draws public attention to the way in which Dr. Davies of Bristol with consummate ability succeeded in limiting (what would humanly speaking have proved) "an epidemic" to the small proportions of what is now generally styled "an outbreak" of smallpox. A similar tribute of praise is due to many other medical officers of health, especially those of the port authorities. It will be noted from comparison of the returns officially sent from Whitehall, how frequently during the long period of freedom from smallpox, the disease has been imported from abroad and how rarely it has passed inland.

In contrast to all this one cannot but recur with regret to the Dartford cases which occurred in 1901-2, *i.e.*, the hundreds of workmen engaged in extending the buildings of the metropolitan smallpox hospitals in the winter, large numbers of whom fell ill, being insufficiently protected by vaccination, and who, returning to their homes while sickening, scattered the infection far and wide, adding very much to the expense and trouble of the epidemic. All this expense should have been quite unnecessary. A few hundreds of pounds spent in vaccination and compensating workmen so that they should not suffer by loss of wages when their sore arms incapacitated them for a few days, would have averted a subsequent expenditure of many thousands of pounds on account of the care needed for the large number who became infected through want of *the* essential precaution.

As showing still further that our precautionary measures in London, at any rate, still need improvement, it should be mentioned that even among the ranks of sanitary inspectors were a few, who, having omitted to avail themselves of the opportunities of re-vaccination, were unfortunately attacked with smallpox in the discharge of their duties. Here again, of course, persuasion or indirect compulsion should have been exercised. It is so with nurses and attendants, generally, at smallpox hospitals; also with the ambulance drivers and assistants.

Smallpox Hospitals.

Smallpox has always been recognized as extremely infectious, and the alarm that it gives rise to is as much due to this fact as to its unpleasant and dangerous nature. When the epidemic of 1871-2 occurred, and inspired such a panic throughout the country by its heavy and unexpected incidence on the vaccinated, but *not re-vaccinated*, adult population, the sick persons had to be treated for the most part at their own homes. Many other cases were treated at or near to workhouses, and in some of the wards or appurtenances of general hospitals. As between the conditions which passed muster then, and those which are now required, there is indeed a striking difference; for whereas only forty years ago smallpox took its place with typhoid and other infectious fevers, and might be treated under similar circumstances, we have now been driven to the opposite extreme, and compelled to treat the patients under extraordinary conditions of seclusion. In order to explain, it becomes necessary to touch on some of the principal events that have happened in this department of preventive medicine.

For some time after the great epidemic of 1871 authorities were stimulated by the Local Government Board to provide isolation hospitals for smallpox, as well as other

infectious fevers. In the following decade many hospitals were planned for the treatment of this disease under the same administration with other fevers. In fact, it was dealt with as we at present deal with diphtheria, scarlet fever and typhoid. But the peculiar infectiousness of smallpox introduced special difficulties, which gradually led to an abandonment of this system, although there are still some districts which consider themselves provided with smallpox hospital accommodation, having a ward or building annexed to the general group of buildings, the plans of which were passed by the Local Government Board several years ago.¹

It was in the winter of 1881 that a very remarkable and portentous discovery was made by Mr. W. H. Power, F.R.S. (now Sir William Power, K.C.B.), then one of the medical staff of the Local Government Board. This was founded on observations first made in connection with a certain metropolitan hospital used for acute smallpox, and subsequently repeated in the neighbourhood of the same and other hospitals. Dr. Sweeting, now senior inspector of the medical department of the Local Government Board, was the medical superintendent of the hospital. It was shown that the disease appeared in the neighbourhood on the introduction of a certain number of cases to hospital, and that the incidence of smallpox was generally greater around smallpox hospitals than elsewhere. Similar observations, to which very great prominence has been given, have been made else-

¹ The difficulties in respect of hospital accommodation in which the counties around London were placed in 1901 arose only in part from the above circumstances. They were also in considerable measure due to the fact that arrangements that had long held good for the reception of cases to the London ships and hospitals from outside districts, broke down under the stress of the epidemic. It thus happened that in the County of Surrey a number of populous districts would have been deprived of accommodation had it not been for the timely help of the Surrey County Council in negotiating for the part use of the new hospital which had then just been erected at Cheam.

where, and the result of Sir William Power's work has been generally to create a belief, now very widely entertained in the medical profession, that there is a particular risk in the matter of smallpox infection, especially when very large numbers of acute cases are aggregated at hospitals. It is now generally accepted that for a distance of half a mile or so there is some risk of infection; its exact nature, its extent or proportion, and how far it is reasonable and practicable to guard against it, being still debatable subjects. In the meantime a working hypothesis has been devised. The rule of the Local Government Board that a hospital must be quite separate from other establishments, and that the population within half a mile should not exceed a certain number, is now in operation. It is in consequence of this rule having apparently been made retrospective, whilst the 1901 epidemic was in the ascendant, that many districts formerly considered to be sufficiently provided with accommodation for smallpox are, under the existing rules, held to be without such provision. Even under exceptionally favourable natural conditions (as for example in a county with a fair proportion of rural districts) the difficulty that may attend the establishment of a hospital is a very important consideration. This has been already demonstrated in the county of Surrey.

Smallpox Hospitals a Necessity.

When the great importance of Mr. Power's discoveries came to be realized, some high authorities became disposed to discourage all reliance on hospital isolation, seeing that vaccination and re-vaccination would, if fully used or enforced, alone suffice to prevent epidemic spread. The remarkable experience of London during the period of 1886-1900, during which an improved system of hospital isolation had been in practice, may by now have modified that professional opinion. During

that long period smallpox became lessened to such an extent that no wonder some were led to hope that in hospital isolation we had a more powerful factor in the prevention of epidemics than is probably the case. The 1901-3 epidemic, though quite small as compared with that of 1871, nevertheless assumed in London and adjacent counties the proportion of the epidemics in the early eighties. This was to some extent disappointing, as better results were obtained in the great provincial towns. But inasmuch as hospital isolation is only one part of a sanitary organization, in which medical administration (*i. e.*, service outside the hospital) plays an equally important part, we must be prepared to take a wide view of the situation in 1901. It is unfortunate that there were no inquiry and report respecting the details of administration in the various parts of the metropolis, as well as by the hospitals board. It would have been simple justice to acknowledge how much we owed to the Metropolitan Asylums Board, and that the hospital isolation system had a great deal to do with the limitation of the 1901-3 epidemic. After making all allowance for the incompleteness of arrangements (which had to be carried out under circumstances which, even if they could have been partly foreseen, could not have been entirely provided against), it is indeed difficult to pronounce isolation to have been a failure in London. Such a conclusion is contradicted by the charts, and in many of the great towns of England and Scotland the evidence of success was still more striking.

But there are other reasons for maintaining the necessity of special hospitals. The fear of the infection of smallpox is as great now as ever. Very many of the sufferers must absolutely be provided for at the public expense. Their reception at workhouses or ordinary hospitals would not be tolerated. There must be some special provision of a suitable kind for them. Tabular

statements showing the large proportion of cases occurring among tramps and others who may be defined as being without proper lodging accommodation, were published eight or nine years ago. When the next considerable epidemic occurs it is very likely the ratio of child attacks to those of adults may be affected; but there again everything will depend on early diagnosis, prompt isolation, and attention to contacts.

Again, throughout the last epidemic many medical men must have experienced the great inconvenience and pecuniary loss in attending a case of smallpox to the detriment of their general practice. In any district where the relief of a smallpox hospital has been once felt by the general practitioners, any proposal to abandon the establishment would be regarded with dismay. In fact, no medical officer of health would recommend such a course under existing conditions in this country, however strongly he might theoretically favour the policy of re-vaccination as carried out in Germany or Japan. Such being the case, it only remains to be considered what, by the light of present experience, can be said to be the requirements of a population. But before discussing this it will be convenient to refer to certain other points of administrative importance, viz., disinfection and ambulance provision.

Ambulance Arrangements and Disinfection.

There is nothing in which the need of central control of all arrangements connected with the isolation of smallpox is more obviously felt than in removals to hospitals. These have in the past necessitated long journeys, and they must frequently do so in the future. Special arrangements have to be made, and all drivers, chauffeurs and other attendants must, of course, be recently re-vaccinated. In counties the local authorities should assist, and having regard to the importance of this part of the work it needs

to be carried out by the county authority in no niggardly spirit. Every county must be considered separately. In the large counties the localities and different parts must be arranged for according to their surrounding circumstances. But as a general rule, in the matter of both hospital and ambulance provision, county borough authorities would do well to combine with the authorities of the county in which the borough is.

Fortunately the advent of the motor system, and the complete way in which people have now accustomed themselves to its use, dispel some difficulties which at first seemed formidable. These were inherent to ambulance removal and hospital administration when it has to be conducted in sequestered situations far distant from populous centres. A form of ambulance is now in the market in which the "body" of the carriage can be easily detached from the "chassis" or traction part of the machine, in exchange for another "body." In the case of smallpox, the advantages of this substitution method are obvious. The contagium of smallpox, though it so readily attaches itself to persons and things, is fortunately easily destroyed. In the case of a properly constructed ambulance many rely on a good fumigation with sulphur and a subsequent wash down with plenty of soap and hot water, and there appears to be no reason to think that such measures are insufficient to free the structure from infection.

Unfortunately in the case of clothing it is different, for it has long been recognized that infection may occasionally be carried by third persons. The late Sir William Jenner, the famous physician of Queen Victoria, gave some very striking evidence under this head to the Royal Commission on Smallpox Hospitals in 1882. Unhappily there was one very distinct instance during the 1902 epidemic which was investigated by the writer as county medical officer of health with Dr. William-

son, the district medical officer of health, in which the infection was undoubtedly conveyed in this manner to a person at Epsom, either by the infected clothing, or perhaps the hair, of two female visitors to the metropolitan smallpox ships near Longreach.

The protection and disinfection of the person, hair and clothing require a great deal of care and attention. The precautions to be observed are similar to those adopted at Nottingham in 1882, when the writer had to carry on the ordinary duties of a medical officer of health during a smallpox epidemic; and again some years later in London (1887-90), when he occasionally found it necessary to visit the metropolitan hospital ships in order to acquire special information. It may also be mentioned that the rules now referred to are substantially the same as those which he assisted in drawing up, and which were issued by a committee of the Royal College of Physicians in 1889. They accompanied a report on the necessity for clinical instruction of medical students in smallpox.¹

The visits to cases of smallpox, chicken-pox, and other cases that bear a suspicious resemblance to the more serious illness, should be as few and as short as it is possible to make them, consistent with the performance of our medical duties. The sacrifices required for this purpose are indeed a significant addition to the trouble and anxiety of medical practitioners and others, at times when their skill and attention are so necessary for their patients, as well as in the public interests. But—

¹ The President of the College at that time was the late Sir Andrew Clark, Bart., and the Registrar was Dr. Edward Liveing. The committee was presided over by the late Dr. Samuel Jones Gee, and the Hon. Secretaries were Dr. Samuel West and the writer. The Right Hon. C. T. Ritchie was President of the Local Government Board, and Sir Edwin Galsworthy was Chairman of the Metropolitan Asylums Board. Powerful influence was brought to bear in giving effect to the report of the College by the Right Hon. the late Earl Granville and the Right Hon. Dr. Robert Farquharson, also by the late Dr. Jno. H. Bridges, Medical Inspector of the Poor Law Department of the Local Government Board.

although perhaps he need hardly say this—the writer believes that at our hospitals, and generally throughout the country, personal precautions of this kind have been most scrupulously observed by doctors, students, visitors and attendants of all grades.

CHAPTER IX

SMALLPOX (*continued*)

PRESENT REQUIREMENTS FOR PREVENTION—USE OF EMPTY HOSPITALS AND HOSPITAL WARDS—THE SURREY COUNTY SMALLPOX HOSPITAL—THE LEICESTER EXPERIENCES—GLASGOW ISOLATION HOSPITALS—SUMMARY OF CHIEF REQUIREMENTS FOR PREVENTION AND CONTROL OF INFECTIOUS DISEASES IN THE UNITED KINGDOM.

IN the previous chapter we have discussed at sufficient length, on the one hand, the absolute necessity for preventive measures against smallpox, a very infectious disease, which at the same time is one of the most dreaded and one of the most preventable. On the other hand, we have had to consider the peculiar difficulties in the way of the most practical preventive measures. These have arisen partly from opposition to vaccination, and partly from the strong objection to smallpox hospitals, so often evinced in the localities where they are placed. Added to this there is the further peculiarity that the disease is exceptionally uncertain in its behaviour, and that for some years now, there having been no prevalence in epidemic form, the stimulus to action by local authorities has been absent. If, in spite of all this, progress is being steadily made on a sound system, it is surely a tribute to the administrative abilities of our local authorities.

The freedom from smallpox throughout the country generally has of late often been commented on. Refer-

ence has already been made to the remarkable manner in which the disease, having been so many times brought to this country during the last few years, has been stopped at the port of debarkation; and when outbreaks have occurred in spite of our coast defences, either in the seaport or far inland towns, they have been confined within comparatively narrow limits by the skill and energy of the local medical officer of health and his assistants.

Government Survey and Inquiry Needed.

Cases, however, occur from time to time which show that in spite of all the precautions taken there is great risk of infection from abroad being passed through to towns or centres of population in which the defences against smallpox prevalence may prove deficient. For this reason, and on account of the growing neglect of systematic vaccination, it is very desirable that a survey of the smallpox hospitals and an inquiry into the preparedness or otherwise of the authorities throughout the whole country to cope with any outbreaks of smallpox that may arise should be made. The writer regrets that he cannot offer anything but very partial information on this important subject. He surmises, however, that in several counties of England there will be found many towns of considerable size, with weak points in their administrative arrangements and whose isolation provision, if it exists at all, is inadequate. Some of this provision would be found to consist of structures suited for persons of the tramp class, but hardly for patients of the better class who require isolation and are entitled to its benefits. He could point to one instance at least where a manufacturing city with a population of over a quarter of a million is provided with accommodation of a kind which suggests that it must have originally been hastily run up to meet the demands of a panic-stricken population

rather than as representing part of a well-thought-out scheme for smallpox prevention.

Temporary Hospitals.

Owing to the position of things described in the last chapter, there is everywhere throughout the whole country, in unprovided districts, likelihood of structures being erected of a purely temporary character—that is, without even the basis or essential parts of a “hospital,” properly so called. It is, of course, impossible to prevent their erection at times of general alarm. The writer has often expressed his opinion with regard to provision of structures of this kind. In former times, *i. e.*, in the seventies, they were run up during the height of an epidemic to afford some sort of shelter for the sick, the expenses of their erection coming under the head of “Isolation Hospitals.” Something of the same kind happened again in West Country districts in the year 1896 and since. From the preventive point of view, these encampments, or “hospitals” so called, give a false sense of security to a community, and may be worse than useless. They are sometimes properly objected to as unsuitable for the reception of sick persons. Indeed, respectable people may well be excused for resisting the removal of cases to places where the accommodation is not of a fit kind. It is provision of this sort that has brought discredit on the hospital system. The scheme proper for the control of smallpox by isolation is very different.

A Smallpox Hospital, Town and County Scheme.

The writer now offers a brief description of what has been done in the county with which he is most intimately acquainted. He does this in illustration not only of what a scheme of this kind might be, but of the difficulties that have been encountered in carrying it out.

The administrative county of Surrey has on its north-eastern boundary the county borough of Croydon. In that growing town, about twenty years ago, want of isolation accommodation for infectious diseases was strongly felt. A controversy arose on the "Smallpox Hospital Question" and the atmospheric dissemination theory, as it was then called. The protagonists were a well-known epidemiologist and a prominent medical practitioner of Croydon, who had been a member of the 1882 Royal Commission on fever and smallpox hospitals. It would appear from the local newspapers of that time almost as if there were no desire whatever on the part of residential Surrey generally for a smallpox hospital. Vaccination was at that time being administered on the old system, still it was evidently considered a safeguard with which the public should be sufficiently satisfied. This comfortable conviction was, however, rudely shaken some three years later, for the occasional practice of sending sporadic cases of smallpox to ordinary isolation hospitals led to outbreaks of the disease among the other patients of those institutions.¹ It was clear that such a system could not be maintained, and that separate hospitals for smallpox would be necessary.

Legal Difficulties in Smallpox Isolation.

It was in the year 1894 that the Guildford Joint Hospital Board took the first step towards a completely separate system, by negotiating for the possession of a sort of cottage with its appurtenances and curtilage which did not cover more than two acres of land. The site of this little hospital was on lonely Whitmoor common. A glimpse of its red-tiled roof may be caught from the L. & S. W. Railway after leaving Worplesdon station

¹ These are referred to in the Surrey County Council quarterly volumes of Reports, and the reports of the County Medical Officer of Health for 1893-4.

on the way to Guildford. It was from these proceedings (which were at first quietly conducted) that, later on, there arose the *cause célèbre* of Garton v. the Guildford Joint Hospital Board (a *quia timet* action), the applicant for the injunction believing that he was liable to infection from a patient at a distance of more than half a mile. At the subsequent trial of the cause in the High Courts he was able to justify the reasonableness of his fear by the testimony of no less a person than the late Sir Richard Thorne-Thorne, who at that time had become Medical Officer of the Local Government Board. In the end the ruling of the court was, however, in favour of the hospital board. The Guildford authority deserve all credit for having fought the battle for the very existence of such an institution as a smallpox hospital, but unfortunately they came out of the struggle with such restrictions as prevented, some few years later, more extended usefulness of the institution. Shortly after this trial, early in 1896, the writer had the honour of giving (by request) the Milroy Lectures before the Royal College of Physicians. He then took the opportunity of advancing the cause of hospital isolation, illustrating its effects chiefly by the memorable experience of London in 1885, before and after the radical change of system by removing cases to a distance of several miles down the river Thames.

County Council Action.

We must now return to the date at which initiative measures and steps were being taken. It was in 1893 that the Isolation Hospitals Act was introduced. The Surrey County Council had from the first, in 1890, adopted an advisory and consultative attitude to local authorities in matters of sanitation and Public Health. Subsequently, with powers of the Isolation Hospitals Act 1893 behind

them they succeeded in a few years in getting the local authorities, separately or in conjunction with others, to establish institutions for the infectious sick. The success which they attained is shown by the results recorded at pp. 181-183 of this book. The same system was followed in the case of special smallpox requirements. The Croydon and Wimbledon Joint Hospital Board became established, and it was officially contemplated that should the arrangements by other authorities in the county prove insufficient there would be ample accommodation for the county in one fairly-sized hospital situated in a locality where suburban and rural Surrey meet. When the 1901 epidemic occurred, such an arrangement was in fact brought about by the county council, greatly to the satisfaction of the district councils. The arrangement might possibly have become permanent, but after protracted negotiations it had to be abandoned. A population of over 400,000 persons was thus left without permanent accommodation. In the meanwhile, the district councils, having at the time of stress been encouraged to transfer their responsibilities to the county, now showed no disposition to resume them, and nothing, therefore, remained but to proceed to the constitution of an independent authority, viz., the county smallpox committee.

The following part of this chapter on measures of prevention resolves itself into an account of the establishment of the Surrey Smallpox Hospital at Clandon, and of the possibility which has always been in the writer's mind of the utilization for sanatorial purposes of the hospital situated at Cheam, belonging to the Croydon and Wimbledon hospital board. In 1903 the National Society for the Prevention of Tuberculosis had already begun to urge the promotion of sanatoria on county councils. It was, however, considered at that time, so far as Surrey was concerned, that the smallpox responsibility to the county must first be discharged

before any fresh undertaking was entered upon. At about the same time the writer was occasionally seeing the late Sir William Broadbent, who, as is well known, took a deep interest in fever hospitals and sanatoria. In the course of their interviews the eminent physician liked to discuss prospects of isolation and sanatorial treatment as applied to consumption. He realized that a scheme somewhat similar to that which was foreshadowed in the writer's report of 1902 would have the effect of providing the requisite smallpox accommodation for all Surrey for a good many years to come. At the same time the hospital at Cheam would become available for other purposes except on rare occasions when it might be wanted for smallpox. Now that the Clandon scheme for county smallpox provision is as complete as can well be, the time has arrived for the discussion and settlement of a further question—viz., whether hospital provision for tuberculosis and smallpox on a common and interchangeable basis might not be well worked by one committee. Strange as it would have seemed in past years, this has already come to be regarded as a possible scheme. It would be interesting to speculate on the bearings of the National Insurance Bill in this connection.

Let us now briefly consider the scheme of the new hospital.

The Surrey County Smallpox Hospital.

It was an extremely fortunate thing for the county that, in 1905, when the smallpox committee was established, a county gentleman of high position and ability, John Croft Deverell, Esq., J.P., C.A., was willing to undertake the chairmanship and to carry through what was expected to be, and what certainly has proved up to now to be, an unpopular task. The way in which smallpox hospitals have arisen in the past has been in times of epidemics immediately threatened or existing.

At such times panic prices have to be paid; but they are willingly given in accordance with public clamour. It is altogether different where a carefully-thought-out scheme is devised and carried through with deliberation during a non-epidemic period such as that of 1905-1910. The public may be gainers, but the administrators have to encounter a good deal of misapprehension and misconception.

However, with a full conviction of the necessities of the case Mr. Deverell remained undeterred throughout. He perceived that the main object was to proceed steadily, to obtain a perfectly suitable site, and to provide the necessary buildings and appliances. The Isolation Hospitals Act provides that the cost of the hospital may be paid for at the time, instead of constituting a debt for many years belonging to the committee's constituent authorities. The former course was adopted. Furthermore, the chairman of the committee took exceptional pains in selecting and actually securing a site to meet to the fullest extent the present exacting requirements of the Local Government Board. Having achieved this, the committee decided in favour of very simple buildings sufficient to afford accommodation for twenty-five patients, but with the site laid out with concrete plateaux on which temporary structures could on emergency be erected in two or three weeks' time. The permanent wards are well arranged, not only for the differentiation of cases, but also for the separate isolation of those that are of a doubtful nature. To these permanent buildings is attached an administrative block capable of housing a staff, and making all provision for the storage and preparation of food and other necessities for the largest number of patients that are likely to require treatment at any one time in the county. There is also attached a good-sized laundry with all modern appliances and a steam disinfecter. These,

with the usual appurtenances of a hospital, have recently been made complete under the advice of the present County Medical Officer of Health, Dr. T. Henry Jones, M.A., by a garage for motor ambulances. The hospital is of course on the telephone. Water and gas are laid on by the public companies of the district. The sewage and laundry refuse disposal arrangements were placed by the chairman of the committee in the hands of Mr. Scott Monerieff, the well-known authority on the subject.

The situation of the hospital, in the heart of rural Surrey, is ideal. The area at the disposal of the county smallpox committee is twenty acres, four of which are devoted to the above-described buildings, etc., and surrounded by a barbed wire fence. The grounds are laid out simply but tastefully. A small house is provided for the caretaker and his wife. The caretaker and his assistant are constantly engaged in keeping everything in order and ready for use. Arrangements have been made for the provision of requisite medical attendance and nursing in non-epidemic as well as epidemic times.

There has thus been provided the nucleus of a hospital with every facility for rapid expansion, and that is just what is wanted for smallpox purposes. If it should be thought well to enter into such arrangements as would make it available for the whole county (including the part at present served by the Cheam Hospital) at any rate as a first line of defence against epidemic smallpox, the writer believes that it would be suitable. In 1908 he tested the adaptability of the motor ambulance system to the requirements of distant parts of the county, and he has every reason to think there would be no great difficulty in sending for any patients from the parts of Surrey most distant from the centre. For example, Barnes, Wimbledon, Kingston, Mitcham and Croydon in the north; of Farnham, near Aldershot, Reigate, Horley and Lingfield in the south.

Applicability of above Scheme to Counties generally.

The foregoing description may be found of more than local interest, although, besides the differences of size and configuration, there are, of course, other circumstances which make the requirements of each county specially its own. But the writer would venture to lay stress upon the advantages of combining together as many of the hospital authorities of a county as possible, and also of encouraging inclusion of the county boroughs in a county scheme for this large communal purpose. Very important, too, is the making of the smallpox hospital provision suitable for the different classes of patients, as in other kinds of infectious diseases. The possibility must always be borne in mind that among these patients there may, in the future, be a larger proportion of children and young people of a better class than when vaccination was more popular than now-a-days. There is nothing that is more likely to prejudice the public mind against smallpox hospital isolation than a want of sufficient arrangements for the classification of the cases admitted, so that they should be treated suitably and comfortably. Facilities are also required for cases of difficult diagnosis at the hospital buildings, so that they may be separately treated and watched. But it should be understood that the diagnosis ought generally to be established at the patient's home, before removal is directed.

The most important point of all is that the hospital provision for smallpox for a whole county, or for a part of a whole county, as in the very large and populous counties of York and Lancaster, should be in constant readiness. This would by no means seriously interfere with the use of most of the existing smallpox hospitals for entirely different purposes, *e. g.*, tuberculosis, provided always that arrangements have been made first of all by a county hospital board, whereby *one* hospital in each

county (or, as in Yorkshire, county division) should be kept sacred for the purpose for which it was primarily intended.

It cannot be denied that the situation is a complicated one, as every expert knows, for reasons that Dr. Richards of Croydon has given expression to in the *Journal* of the Society of Medical Officers of Health. Both he and Dr. T. Henry Jones, the present County Medical Officer of Health, who wrote an excellent letter for the use of the chairman of the Public Health Committee for Surrey, are in favour, not only of "linking up" the present hospitals so as to facilitate mutual accommodation, but of the actual "pooling" of the whole smallpox hospital arrangements for a county like Surrey, thus removing once and for all the everlasting difficulties arising out of differential rating. Such measures would facilitate satisfactory arrangements for the joint provision against smallpox and tuberculosis. The writer agrees with the principles laid down by these and other chief authorities. A county cannot possibly afford to be *without* a smallpox hospital provision at all times, epidemic or non-epidemic alike. But only on rare occasions would more than one hospital be likely to be required. It would, therefore, on the ground of economy, be unfortunate if difficulties were raised in the adoption of a broad county scheme.

The above relates to the applicability of certain principles to those great towns, counties and large districts which are already provided with sufficient isolation accommodation for smallpox, as well as for other infectious diseases. But is it possible that we can speak of the condition of the whole country as having been authoritatively ascertained? The answer is in the negative. While these pages were being prepared for the press an interesting discussion was taking place in the columns of the *British Medical Journal* between

Dr. Millard, the able Medical Officer of Health of the city of Leicester, and other gentlemen who wrote with the authority of special smallpox and vaccination experience. It was on the old question of compulsory vaccination. One could hardly fail to admit the strength of the case as presented by Dr. Millard, more especially as he guarded himself from misconception by emphasizing the fact that the experience of Leicester is exceptional. Certainly it is so : for Leicester has now, for many years, taken great pride in doing without *systematic* vaccination as applied to the whole population.

The Bearings of the Leicester Experiences.

Most people who take an interest in public health are acquainted with the general facts relating to the large city of Leicester, and to the gradual discontinuance of vaccination on the system applied throughout England, Wales and Scotland. So that now the percentage of vaccinated children must be very small indeed. They will also have noted that, during the long period of thirty years or more, there has occurred no outbreak or epidemic of such vast proportions as was thought only too probable—such an outbreak, for example, as caused a heavy smallpox mortality in Montreal in 1885. It is true that Leicester has suffered from smallpox in common with other towns; but not in a strikingly disproportionate degree. These facts have now been set out and lucidly explained in the correspondence referred to, and the writer proceeds in the following remarks to deal with the various points which are raised.

(1) Dr. Millard makes his own position as regards belief in vaccination as *the* preventive of smallpox perfectly clear. He and all his staff are *recently* vaccinated, and he is a strenuous advocate of the vaccination of “contacts.” (It may be inferred that he has the wholehearted

support of his committee in securing these essential vaccinations or re-vaccinations.) He, as Medical Officer of Health and medical officer of the hospital, is content with the formation of protected cordons by means of vaccination. This, of course, is the opposite of the unlimited use of vaccination, such as is aimed at in Germany. In the one case vaccinations have to be reckoned by the hundred thousand; in the other by the hundred only. The system has, however, been found sufficient in Leicester, and it may, Dr. Millard contends, some day be found adaptable to other large cities in England.

This is not impossible, but—let it at once be said—before responsible medical officials are likely to be induced to take a new departure on these lines, there is much to be considered. In the first place, what is clear enough to the expert is, to the general public, a subject of confusion. To those who regard vaccination as a troublesome business the Leicester experiment is readily accepted as proof that this preventive measure is needless. To the man in the street the case presents itself in some such way as this: "Leicester has long held an antipathy to vaccination. It opposed itself to the Vaccination Acts. Having made itself prominent thereby, it has borne the brunt of smallpox attacks along with other great cities. But it steadfastly adhered to its anti-vaccination attitude, and, nevertheless, has succeeded in controlling outbreaks or epidemics. Leicester did not believe in vaccination, and it has justified its disbelief." This reasoning is entirely wrong.

The fallacy consists in the confusion of two totally distinct things, viz., the general and the particular use of vaccination in the preventive treatment of epidemic smallpox. For though it is true that Leicester has been able to dispense with universal vaccination, it is equally true that, through its officials, it has been in large measure

protected all the time by vaccination specially applied. There is not, however, a clear understanding on this essential point even in the House of Commons itself. How then can it be expected to generally prevail?

Now the impression derived by the public from a too ready acceptance of the popular arguments crudely stated as above would assuredly mean a further blow to the belief in the efficacy of vaccination itself to prevent smallpox. We might then be in danger of having to fight smallpox without vaccination!

(2) Dr. Millard, in his first letter, challenges the affirmation that an unvaccinated person is a danger to the community. He argues that the modification of smallpox by vaccination raises difficulties. In so doing he touches on some interesting points in epidemiology. Recent outbreaks of smallpox are said to have been of a mild type. It has long been recognized that the cases become milder towards the termination of a widespread epidemic, such as that of 1901-3, and those that occurred later on may have been of this type. But there have been other outbreaks marked by severity of type. It would certainly be rash to conclude that, in such a strangely vagarious disease as smallpox, we can calculate on anything for certain as regards type.

(3) There is so much in Dr. Millard's thoughtful and valuable contributions to the literature of preventive medical treatment that the writer of this volume is in accord with, that these remarks of his must be taken as suggestive rather than critical. He would, therefore, urge that if the Medical Officer of Health for Leicester would resume his argument in one of the special societies, attention might well be further directed into the defences of the other towns of England in comparison with Leicester. The state of defences has already been described as probably defective, but there is lack of definite information, which is only partially supplied by reports from great

eties and eounties. Some valuable information is given below from a Report of Dr. Chalmers of Glasgow.

(4) Dr. Millard, in the concluding letter of his valuable series, refers to the always possible adoption, as a last line of defenece, of universal recent vaccination. This would not have been possible till of late years. It has now been made practicable under the new stored glycerinated ealf lymph system.

In the present state of general misunderstanding and imperfect knowledge is it likely that offieials weighted with heavy responsibilities, would, as guardians of the publie health, abandon the attitude they adopt in this matter? That attitude may be described as one of alertness and expeetaney. It was that adopted by the writer of this volume in the artiele on "Vaccination" which he eontributed by request to Quain's *Dictionary of Medicine* in 1901. If he had to rewrite the artiele now, some ten years later, he would have to express himself in somewhat similar terms.

Memorandum on Glasgow Isolation Hospitals.

The Report of Dr. Chalmers of Glasgow, dated April 5, 1910, entitled *Memorandum on Hospitals, by the Medical Officer of Health*, is of exeptional interest and importance in eonnection with our subjeet generally, dealing as it does with such matters as "Changes in Charaeter of Diseases requiring Isolation," "The Non-notifiable Diseases," "The Provision of Hospital Aeecommodation for Whooping-cough and Measles," "The Amount of Hospital Aeecommodation required," and other praetieal questions. Not the least of these arises out of the apparent insuffieieney of the aeecommodation for smallpox in the faee of a demand that might at any time arise. Under the heading "Comparative Statement of Faecilities for Isolation" there appears a

tabular statement which is here reproduced direct from the original, with an additional column to show the recent census population.

Isolation Facilities for Large Towns

Census Population to Midsummer, 1911.	Town.	Estimated Population in 1910.	Fever Beds.		Smallpox Beds.		Total.	
			No.	Rate per 1000.	No.	Rate per 1000.	No.	Rate per 1000.
4,522,628	London	4,795,757	7,078	1·48	2,040	·42	9,118	1·9
747,627	Liverpool	753,203	1,075	1·39	160	·21	1,235	1·6
445,983	Leeds	477,107	474	1·00	184	·40	658	1·4
784,621	Glasgow	884,505	932	1·05	220	·25	1,152	1·3
526,030	Birmingham	563,629	545	1·00	120	·21	665	1·2
455,793	Sheffield	463,222	480	1·03	40	·07	520	1·1
716,163	Manchester	649,251	508	·81	50	·09	558	·9
320,829	Edinburgh	360,548	¹ 554	1·54	48	·13	602	1·67
	Dundee	170,206	125	·74	20	·12	145	·86
	Aberdeen	185,703	² 182	·98	—	—	182	·98

The columns relating to smallpox call for immediate observation. Expressing the proportions of beds to population per 100,000 instead of per 1,000 of the population, the table shows that only 25 beds are provided for each 100,000 in Glasgow, as against 42 in London and 40 in the town of Leeds, although according to the recent census the proportions were under-estimated. The last-named towns may not have more than is sufficient; but, in any case, the inadequacy of the provision for the great industrial centre and seaport of Scotland is very striking. The recommendations of Dr. Chalmers are based on the experience of the epidemic of 1901, when the demand for smallpox at its maximum was equal to 67 beds per 100,000 of the population. The growth of Glasgow,

¹ This excludes forty-six beds for the treatment of pulmonary phthisis.

² Exclusive of children's cots, but including extension of fifty-five beds at present being carried out.

like that of London, has not proceeded at the rate calculated on in 1910. But taking present census populations and calculating for twenty years ahead, a provision of 200 permanent beds is required, but this is to be provided *on a plan which will admit of rapid extension to 600 beds when occasion arises. This is an application of the Surrey plan which has been described above.*

The action taken by the Glasgow authorities will be of interest to all great municipalities throughout the kingdom. In pointing this out, let the fact be emphasized once more that the number of beds provided is not by any means the *only* controlling factor in epidemic small-pox prevention. The assiduity and intelligence displayed in finding out the beginnings of epidemics, and applying vaccination exactly when and where it is most wanted, are equally important. Here the prevailing tone of belief among the medical profession is influential. The Scottish people are slow to change their views. They remember the time when people came to vaccination. Now it must be far otherwise if a medical officer of health, be he ever so capable and zealous, is to have a fair chance in conducting his campaign against the enemy. Vaccination has to go to the people concerned. Let us hope that if the time comes Glasgow, under the able generalship of the Medical Officer of Health, will be able to give as good an account of itself as did the other great city and port of Bristol two or three years ago.

SUMMARY OF POINTS APPLYING ALIKE TO NOTIFIABLE
AND AT PRESENT NON-NOTIFIABLE INFECTIOUS
DISEASES.

We must now conclude this chapter with a brief summary of the several points prominently raised in this volume.

(1) Obviously the first step in prevention is the *early recognition* of the nature of the impending trouble and

the application of suitable measures for repressing the evil or mitigating the consequences. With the proposals of the Commissioners who have so ably dealt with the great subject of Pauperism and its prevention receiving so much consideration, there is little need for claiming special attention to the comparatively limited questions connected with infectious diseases. Still, as long as consequences ensue, serious to the individual and the public at large, we are bound to place early diagnosis among the most essential measures of prevention. Anything done by public authorities to facilitate diagnosis, either by laboratory tests, clinical observations or searching out cases at schools and at the homes of school children, is *all* for the public good in a wide sense.

(2) *School co-ordination and its influence*.—Inasmuch as most of the notifiable infectious diseases are to be found among the children of school age, it follows that their prevalence may be affected to a large extent by the action taken by the school authorities. For example, there is the notable fact that scarlet fever prevalence immediately subsides when the summer holiday season commences and as quickly resumes its upward course when school attendance is resumed. The facts do not appear to admit of any other explanation than that the decrease and increase of the disease are dependent on the schools. (See Diagram K, p. 89.) Similar phenomena have been observed in diphtheria. The co-ordinating powers of school authorities are very great indeed, and the public generally cannot fail to be very deeply interested in the success attending the efforts of all Public Health authorities to diminish these scourges.

(3) *Isolation Hospitals*.—Regarded in the light of centres of preventive treatment, these establishments require to be used on somewhat different principles than have been hitherto followed. Otherwise they will not be

as effective as they might be. The theory of the Metropolitan Asylums Board has been to make these infectious hospitals asylums or places for all persons attacked with fevers to be segregated. It is argued that all those residing in the area have a right to claim "isolation," a term applied to segregation of cases on a huge scale. Joint hospital boards in the country have, also, been advised by their clerks in the same sense, viz., that the hospitals being provided out of the rates, all persons attacked with infectious illness, for which the board has established accommodation, have, as ratepayers, a right to their use. This ruling would deprive the medical officer of health of his right to exercise discrimination from the Public Health point of view. But the writer has been informed on high legal authority that it is doubtful whether such ruling is correct. It certainly admits of an inexpedient practice. In scarlet fever, for example, one could multiply instances in country districts where the removal from isolated cottages of whole families of children already infected with scarlet fever from a first unsuspected and missed case has taken place. This has been done at great cost to the hospital authority, for it has to be remembered that the maintenance of these cases is an expensive business.

In diphtheria the conditions are different on account of the great advantages which have accrued from the antitoxin treatment, which is administered with so much skill and experience by the resident physicians at the special hospitals of the Metropolis and large towns. It is no doubt owing to this and the consequent diminished case mortality that the death-rate has been reduced in London and elsewhere. But the working of the new Antitoxin Order (which provides for free treatment by antitoxin on a much larger scale than hitherto, *i. e.*, for its use outside hospitals by skilled persons and with all due precautions) may, in course of time, effect a great

change. If this should be so, the maintenance of such large numbers of beds may be less necessary.

The public isolation hospitals may then become more and more centres for treatment of selected cases. This is indeed already laid down as one of the principles to guide the use of consumption (phthisis) sanatoria.

(4) *The use of sanatoria and hospitals as centres of instruction as well as primarily for isolation and treatment.*

In tuberculosis Dr. Newsholme, among others, has insisted on the great advantages of the instruction and training of patients in the early stages of the disease. This may be further effected by the agency of dispensaries associated with the sanatoria. The treatment of the advanced cases to prevent spread at the insanitary home is of course also a matter of prime necessity, and should furnish one of the main objects of a sanatorium. The comparatively chronic cases, the carriers in scarlet fever, diphtheria and typhoid, are now regarded as serious sources of public danger, and as needing special care, instruction and training in order that they should not become (when apparently well) the means of infecting other people. We have, therefore, several examples already of the need for using our isolation hospitals and sanatoria in a way that is more likely to benefit the public health generally.

(5) *Measles and Whooping-cough.*—It is becoming recognized on all hands that too little regard has been given in the past to these two infectious diseases, which are not generally notifiable. The Medical Officer of Health for Glasgow has dealt with this subject in the document referred to elsewhere. In accordance with his permission it is now freely quoted from.

In Scotland the death-rate from these children's diseases is even more marked than in England.

“ In many places little or no effort is made to provide them with hospital accommodation. The

general and children's hospitals exclude them because they are infectious; many local authorities make little, and some no provision to accommodate them, on the assumption that hospital isolation has little effect on their prevalence.

"The practice in Glasgow being different from this, can it be shown to have produced any result either in lessened incidence or in lowered mortality?"

In Glasgow they have been specially prevalent and fatal, owing, it is believed, to the custom in that city of housing in "flatted tenements," where whooping-cough or measles "on the stair" implies an element of risk to the children of the other "houses" thereon which has little parallel in the self-contained lodgings in which so large a portion of the population of an English industrial town is housed.¹ The practice in Glasgow having been different from that of Scotland generally as regards isolation and in other respects, can it be shown to have produced results either in lessened incidence or in lowered mortality? By a number of tables and diagrams Dr. Chalmers clearly shows what the effect of sanitary control has been over these two diseases in the course of fifty years, viz., 1855-1904.

"The death-rate from whooping-cough in Glasgow has been reduced by 35 per cent., while in the rest of Scotland the reduction only amounts to 12 per cent. In measles we have witnessed the reduction of 13 per cent. in Glasgow, while in Scotland otherwise the average annual rate in the twenty years ending 1904 was 16 per cent. higher than in the thirty years which preceded."

In further writing on the future policy of the City Council with regard to providing hospital accommodation

¹ In London, however, we have many tenements on the flat system with similar experiences to those of Glasgow.

for whooping-cough and measles, Dr. Chalmers expresses himself as follows :—

“ Considering the prolonged period during which whooping-cough remains infectious after its recognition, the removal to hospital of any considerable proportion of such cases should diminish, to a corresponding extent, the total amount of infection present among the general population at a given time, and suggests hospital isolation as a factor in reducing its prevalence.

“ But there are other aspects which are equally important. Outside the corporation hospitals no provision exists for the hospital treatment of such cases as require it. And the final argument for the provision lies, I think, in the fact that hospital treatment does materially lessen the severity and obviates the danger of many of the *sequelæ* which attend both whooping-cough and measles, and which, if untreated, may permanently impair some of those who survive the attack. Defects in hearing and sight are serious hindrances to efficiency in school and adult life, and underfed children are particularly prone to develop affections both of the eyes and ears during an attack of measles or whooping-cough. So also it may be said with regard to certain forms of lung affections, which, although not immediately fatal, may impair organic functions and form the starting-point for disease of these organs in later years.

“ If hospital isolation may reasonably claim to lessen these risks, it must inevitably tend to reduce the sum of the physical inefficiency to which they contribute, and in so doing to have established itself as an important factor in the sanitary control of the original diseases from which these risks arise.”

(6) *Mutual accommodation in the use of hospitals, sanatoria and administrative staffs.*—It is plain from all that has been set forth in this book that in the future one great want will be felt more and more, not so much in very great cities, which have their own separate accommodation, but in many fairly large-sized towns and in the multitude of small towns and districts which cover our English counties. That want will be mutual accommodation or co-ordination. None but those who have actually served through various authorities can have any conception of the amazing complexity of Public Health and sanitary arrangements which, speaking broadly, has been produced by the affection for our English system of local self-government. Alas, epidemics proceed without regard to district council boundaries, and if only questions of exact legal rights and differential rating could even for a time be made subordinate to the general welfare, much might be done without serious and undue risk and trouble. But for the present we can only hope for a time when broader views may be taken on local government and on questions of inter-accommodation by authorities. There are many points under this heading which it might be considered premature to discuss at present.

CHAPTER X

PUBLIC HEALTH ORGANIZATION

WATER SUPPLY AND SEWAGE DISPOSAL—HOUSING AND SOCIAL REFORM—MEDICAL DEPARTMENT OF THE LOCAL GOVERNMENT BOARD—DISTRICT AND BOROUGH MEDICAL OFFICERS—PRACTITIONERS OR SPECIALISTS—COMBINED SANITARY DISTRICTS—ISOLATION HOSPITALS—DISINFECTION—CARRIERS AND CONTACTS—MEDICAL ASSISTANTS—SANITARY INSPECTORS—COUNTY NURSING ASSOCIATIONS—LONDON AND THE GREAT TOWNS—COUNTY OFFICERS.

THIS is not a treatise on what is called Public Health, on which subject several excellent works have appeared from time to time. Some of these deal with their wide and comprehensive subject so completely that it is not surprising the books have run through several editions. The title chosen for this book is less ambitious and indicates as nearly as possible its intended scope. It is a trite saying that "prevention is better than cure," but the real truth is that prevention and cure are often practically inseparable in medicine, although at one time it may be the preventive, and at another the curative, side of the treatment that is uppermost. The nature of this relationship is admirably illustrated in the memorandum of the present Chief Medical Officer of the Local Government Board on the administrative control of tuberculosis. Writing of such measures as early diagnosis of phthisis, of providing information to

the medical officer of health as to the prevalence of cases among the poor, of the removal of sanitary defects, of the investigation of the cases, of advice given as to disinfection, of the avoidance of self-infection or re-infection and the provision of spit-bottles for that purpose, of the cleansing methods to be recommended, of dispensary and sanatorium and hospital provision, Dr. Newsholme continues as follows :—

“ These measures are, to a very large extent, also measures for *aiding* consumptive patients. The two objects cannot, in fact, be completely separated. The measures taken for preventing infection equally prevent the patient from receiving further doses of infective material, and he especially will gain by their success. That no strict line of demarcation can be drawn between personal and communal interests is further indicated by the fact that the community, by diminution of infection and by avoidance of loss of working ability, gains greatly when patients are cured, or when, apart from their cure, they are so housed that they cease to disseminate infection. *Hence measures for the treatment of the individual patient cannot be left out of consideration in providing against the spread of the disease, any more than they can in the case of enteric fever.* In both diseases the cure and the care of the individual patient are the most effective means of avoiding further cases.”

The term *preventive treatment* may therefore be considered sufficiently descriptive of the subject of this book. At present it is really only essential to give an idea of the ways and means by which systems, schemes and plans recommended by “ leaders ” in the campaign against *infectious diseases* have proved feasible and effective. This is a very important part of the sanitary

organization of the country, but obviously the whole continuous business of the constituted authorities of England in relation to public health is concerned. Some account therefore of this organization, even though incomplete, becomes desirable.

Water Supply, Drainage, Sewerage and Sewage Disposal.

To mention these headings alone is to indicate a colossal work, to the results of which we owe much of our freedom from preventable illness in this country. Take as an illustration the case of the city of Nottingham, with its population of 260,000 (less than half that of either Glasgow, Manchester, Liverpool or Birmingham, and not even equal to that of one of the largest of the twenty-nine metropolitan boroughs). Consider, then, in detail, the number of departments, experts, officials, inspectors and workers of all sorts, skilled and unskilled, required by the municipal undertakings of such a city, and what is involved by its needs. Some conception will then be arrived at of what becomes necessary for the vast province of houses covering the area of the county of London, which includes twenty-nine sub-areas partly under municipal borough control, and the still wider area of what is now called "Greater London" with its population of 7,250,000 (about ten times that of either Glasgow, Manchester, or Liverpool). But as this consideration does not immediately touch the matters dealt with in these pages it would be better to omit descriptions which must involve questions of principle in local government, such as the municipal or commercial control of water supplies.

Housing and Social Reform, Town Planning, etc.

A similar feeling of profound respect for the importance of this subject bids us refrain from entering into a "con-

densed," or as it might be termed "sketchy," account of the several agencies in the gradual progress of "housing reform" directed or controlled as they are by the higher powers in district government (local as well as central). It is not many years ago that the late Dr. George Vivian Poore, a very distinguished physician, was devoting himself to the study and exposition of the chief principles involved in rural hygiene. Now, if he had only been spared to complete the span of life allotted by the Psalmist, he would actually be witness of a "root change" apparently beginning to take place—a change so vitally important that probably before long, not only will by-laws as to dwellings have been essentially altered, but building surveyors and sanitary inspectors appointed to enforce them will constitute an army, maybe as large as now, but of a more varied and suitable kind. Poore was a man rather before his time, but it is safe to predict that the "east-iron" regulations against which he, in his writing and teaching, used to inveigh will have become comparatively elastic and suitable to circumstances. We shall then no longer see the anomaly of town villas and rows of little town houses dumped in really country districts. With sensible alterations in the type of habitations, there will come a whole train of other changes affecting the mode of life of a large section of the people. The recent speeches and reports of F. E. Fremantle, Esq., F.R.C.P., etc., the able and energetic medical officer of health for Hertfordshire, who is so well fitted for a political career, are very interesting, coming as they do from a thoughtful and practical man. Special reference should also be made to the *Housing Handbook Up-to-date*, by William Thompson, Esq., County Councillor, and Alderman of Richmond, Surrey. It is significant that Mr. Thompson, who speaks with the authority attaching to his position as Chairman of the National Housing Reform Council, referring to recent developments of

“house planning,” considers the schemes are now on a sound commercial basis.

In closing this brief sub-section on sanitary and social reforms (of which the housing is the greatest), the supreme influence of the President of the English Local Government Board, in guiding its policy since 1905, must be prominently acknowledged. Even a mere enumeration of what might constitute headings of separate chapters shows the many strides forward in public health organization. For example, the Orders and Memoranda of the Board relating to medical officers of health, the adoption of the term “poor person” instead of “pauper” in connection with preventive treatment, and the Midwives Act (under the Privy Council and the Local Government Board) are of enormous significance. So also the great attention given to the quality of food-stuffs and the establishment of a central department for maintaining their purity by means of bacteriological as well as chemical scientific inquiry have constituted great advances in practical administration. Above all, the carrying of the Housing and Town Planning Act ranks among the greatest achievements in social advancement. Severally and jointly, these advances have permanently raised the standard of the public health in a direction and on a system which is capable of large development. In addition there is the factory inspection directed by Sir Arthur Whitelegge, K.C.B., M.D., F.R.C.P., under the Home Office—a department which has now for several years been developed with a view to the prevention of occupational diseases.

The writer has at hand a large amount of material bearing on all these subjects; but at present it is thought better not to complicate the questions under discussion in this book by introducing others which are by no means confined to infective diseases. We will proceed, therefore, to briefly describe that part of the public health

organization which bears special relationship to diseases of this particular class.

The Medical Department of the Local Government Board.

In *English Sanitary Institutions*, Simon traced from earliest times the growth of our system of public medicine to the foundation of the above-named department, which about forty years ago became amalgamated with that devoted to the poor law administration. Since Simon's time, the value and importance of the medical department have become more and more recognized by the State. Formerly, it was associated almost exclusively in the public mind with the administration of the Vaccination Acts (a matter of purely routine business); the investigation of the causes of cholera and typhoid epidemics, then sometimes water-borne; and the defence of the country against the importation of Asiatic cholera, plague, and other exotic diseases. In the course of years the work of the department has become more intimately associated with the daily life of the people. The prevention and control of endemic as well as epidemic diseases, the wholesomeness of food supplies, housing and many other conditions affecting individual as well as communal hygiene, are now all within the purview of the Board.

Besides the chief or principal medical officer and the two assistant medical officers, the senior of whom, Dr. Theodore Thomson, C.M.G., has officially represented this country in its international relations, the Board medical staff consists of a number of expert officers, permanent and occasional. These gentlemen have been selected for their position on account of their special knowledge in the various departments of preventive work in which the Board is engaged. Dr. Bulstrode

has already been mentioned in the chapter on tuberculosis. His work has also included the production of two other important official volumes relating to the condition of oyster culture and the prevention of a large amount of illness generally due to unwholesome shellfish of all sorts. Dr. Buchanan, another member of the staff, now an assistant medical officer, has for several years been at the head of the food department, whose investigations and reports concern every member of the community to a degree even more important than does the somewhat limited scope of the old Food and Drugs Adulteration Act. The works of these two scientific authorities together cover a large field. Dr. Sweeting (so well-known for the essential part he took many years ago in furnishing the grounds on which the policy of the Board and the action of the metropolitan authority were determined, in regard to the removal of smallpox cases away from centres of population) is a recognized authority on fevers, and a learned epidemiologist. Dr. Monckton Copeman, F.R.S., is now the recognized chief authority on vaccination, for which he has done so much by establishing its relation to smallpox, thereby placing it on a sound scientific basis.

The names of these gentlemen are mentioned to illustrate the varied kinds of qualities required of the English Local Government Board officially in the exercise of its functions. These are partly executive, inspectorial and investigatory, and partly advisory and judicial. Indeed, so highly is the Board regarded, that its assistance may at any time be invoked, not only in any part of the United Kingdom, as was the case when the Belfast Commission of Inquiry (Dr. Darra Mair) took place, but throughout the Empire, as witness the investigation of the plague in India (Dr. Farrar).

The arrangements for vaccine provision are at the present day on an entirely different principle to that of

former times, when, as we have seen, Dr. Edward Cator Seaton practically initiated and was responsible for the direction of the national system. That system was the best that could be devised at the time, and in spite of all that has been said against it, constituted a great boon, being in those days the only protection of the country against the constant ravages of smallpox. Dr. Blaxall is now in charge of the national vaccine establishment at Cricklewood, and Dr. Fremlin is the assistant bacteriologist. The whole staff of the medical department is now twenty-seven in number.

Side by side with the medical department is the poor law administrative department, the medical element of which is represented by Sir Arthur Downes and Dr. Fuller, the first-named of whom has had a life-long work in all branches of public health administration.

There are other pathologists, physicians and physiologists, such as Dr. Klein, Dr. Andrewes, Dr. Martin, Dr. Foulerton, Dr. Savage and several others, whose assistance is engaged on special occasions, as was the case in former times when the famous Burdon Sanderson, Bristowe, Dupré, Netten-Radcliffe and Ballard contributed to those volumes, which have done so much to establish the high reputation at home and abroad of the celebrated Government Medical Department. To this department there was almost from the beginning a "secretary" attached, the senior of whom now living is Sir John Rotton, K.C., afterwards legal adviser to the Board. The writer in his youth became known to Sir John in the sixties, and since then has had the privilege of close acquaintance, having frequently enjoyed his hospitality at his charming country house, with its famous garden, on Frith Hill, near Godalming, Surrey. Long association with the officials of the Board makes it difficult for one who, partly through family connections, has been on terms of close friendship with so many of them, to

break off with this short account of this department and its life history. But as nearly the whole of the writer's professional life has been spent in the less prominent, but no less essentially useful, work of local authorities, he must devote the remainder of this section to that portion of his subject.

The County of London.

The County of London, the vast province of dwellings with its four and a half millions of people, comes next to the nation as a whole. The importance of its Medical Department in relation to our subject is second only to that of the Local Government Board, although the Metropolitan Asylums (Fever and Smallpox Hospitals) Board still remains an independent Central London Authority.¹ The *London County Council* has from the time County Councils were created in 1888 ranked separately, chiefly for the reason that it succeeded at once to the position and great responsibilities of the old "Board of Works," another central authority, which, till the year 1889, performed executive functions of a high order. Engrafted on this position is that which the "L.C.C." has made for itself. It would be quite impossible in this short chapter to describe the administrative functions, advisory as well as executive, in its present state of development, of the greatest town council in the world. Suffice it to say that, as far as our subject is concerned its influence is felt in every direction. The Public Health Official Department has been presided over from the first by Sir Shirley Murphy, whose work and reports are so well known for their excellent and comprehensive character, that comment is needless.

¹ See Address to the British Medical Association on "the Evolution of Sanitary Administration," by the writer, in the year 1891.

District and Borough Medical Officers of Health.

As the appointment of these officers may be said to be more directly under the Local Government Board than in the great towns where the governing bodies have long acquired a feeling of independence, description of the duties and position of medical officers of health may appropriately begin here. Bearing in mind that it is with the part of his duties relating to infectious diseases that we are specially concerned now, we need merely enumerate some of the duties which a "whole time" medical official appointment may be made to include. These duties under the Public Health Act are sufficiently multifarious, but in addition they may be associated with those of a public analyst, a bacteriologist, medical officer to the isolation fever hospital, medical officer to the local education authority, medical officer to the local supervision authority under the Midwives Act, not to mention those of police or factory surgeon. Even the weighty legal responsibilities of a coroner have occasionally, though rarely, been attached to those of the medical officer of health. The variety of these duties and the qualifications necessary to carry them out with credit to the official himself, and advantage to the public, are such that, as may be readily understood, many capable men are unwilling to risk the sacrifice of their professional prospects for a modest remuneration, often without certainty of pension, even in these days. Hence a question which was frequently discussed at the beginning of the seventies is still unsettled. "Whether it is desirable that a medical officer of health should be a local medical practitioner or a specialist" is now as formerly causing the district councils of comparatively small communities (the majority of our local authorities) a stock subject for debate. Indeed, this may be said to be the case also amongst the outer and inner circles of informed

officials. To deal comprehensively with this vexed question, as to which there has been diversity of opinion for so many years, would be quite beyond the scope of this work, but nevertheless, a few words may not be inopportune at the present time; and this for the special reason that the Insurance Bill introduces novel situations and gives matter for fresh consideration.

Practitioners or Specialists ?

The chief reason why there has been so much diversity of opinion, and how it has happened that the opinion of the Local Government Board itself has sometimes inclined one way and sometimes another, is that not only have the duties of the office altered from time to time in both character and extent, but it has even been changed in its *intention*. Within the last five years we have heard much of the shifting of public attention, both in town and country, from "communal" to "individual" hygiene. There is, indeed, a great deal of essential difference in the meaning of these two expressions, and some further explanation may be given. Those who can remember the famous health exhibition of 1884, the "Healtheries" as it was called, will call to mind the prominence given to what has been perhaps not inaptly termed "constructional hygiene." Some illustrations of this were obviously of individual interest, and none of them can be said to have been without it. For whether a medical officer of health is considering geological conditions connected with a public water supply, or the relative merits of chemical and bacteriological methods of purifying water, he is in a general way considering the interests of each member of the community. But every one must at the same time recognize that different training and qualities are required when it comes to a question of deciding

whether it is to the advantage of a special locality that a midwife of the district should continue to practise or not, whether a child with throat symptoms of a particular kind should be allowed to go to school or not; or again, whether it is expedient that a particular case of tuberculosis should be reported to the public sanitary authority, and if so how the information should be used. In short, the time having passed when the activities of a medical officer were so frequently engaged in the promotion of better systems of water supply, sewerage, house drainage, and the removal or investigation of unhealthy nuisances, the necessity of all these improvements being conceded, and indeed sufficiently provided for in most districts, large and small alike, this reason for the health officer-ship being dissociated from medical practice no longer exists. On the other hand, as the medical officer comes more and more in touch with the people individually, and is especially concerned with the state of health of those within the district who are of school age, his knowledge of medical diagnosis and treatment must be kept bright, and the argument in favour of his being in practice is proportionately strengthened. At present we need pursue this complicated part of our subject no further, especially as, if the provisions of the Insurance Bill come into operation, there will be many new points to discuss.

The above remarks are intended to apply to country, suburban, and quite small town districts—say those with a population of less than 25,000.¹

United and Combined Sanitary Districts.

The difficulty of making up a salary sufficient to maintain a medical officer of health, who is without income from practice, led, soon after the Public Health

¹ A glance at the list of great towns of the United Kingdom which appears in the Registrar General's report, shows the lowest limit of population which entitles the town to be called "great" is 50,000.

Act came into operation, to combinations of districts for the appointment of specialist medical officers of health. These gentlemen, whose work sometimes extended over very wide areas and into different counties, conducted it with much success; but in course of time with the growth of Public Health work, especially during the last few years, these very large districts became unworkable and have had to be subdivided. If these subdivisions be not too large, it has been found quite feasible to combine the appointments with that of medical officer to the isolation hospital, as well as that of laboratory expert, etc.

Isolation Hospitals—Disinfection—Carriers and Contacts.

After all that has been said in the chapters on scarlet fever and diphtheria, it would be mere repetition to describe the use respectively of the measures indicated by the above heading. Concisely stated, it should be the object of the medical officer of health in non-epidemic periods to keep the hospital as nearly empty as he can, and in times of epidemics of one or the other kind, to keep down the number for which hospital isolation is necessary to its lowest attainable limit.

Disinfection of clothing, bedding and rooms in infected houses is, of course, necessary, and for this purpose properly equipped disinfecting stations are required. It is also desirable, if possible, that the disinfection business should be carried out by or under a special inspector. But we are becoming more and more impressed by recent scientific observations and inquiries, that, valuable as these measures are for limiting the spread of infection by inanimate objects, it is, broadly speaking, to living creatures, the possible carriers of infection, that attention is urgently needed.

Carriers of infection are of two kinds. There are the

“contacts” who may sometimes carry away infection on their clothes, for example, which like other infected articles or household goods can be submitted to the customary disinfection by steam, spraying or fumigation. Again, there are those other carriers, who are themselves sufferers from the special bacterial or microbial infection, that of scarlet fever, for example, in its mildest and almost unrecognizable form. Worse still, regarded from the point of difficulty in devising methods of preventive treatment, there are the carriers who may harbour infections within their person when, as occurs sometimes with diphtheria, they are going about apparently in a state of normal health.

Medical Assistants to the Medical Officer of Health.

Cases of the above kind are sources of danger to the public health and should be inquired into. It is in these inquiries, which are of a particularly personal kind, that the exercise of knowledge and cultivated powers of observation, etc., acquired from long medical training, is necessary. Indeed, those best qualified to judge agree that the object being to *prevent* disease, that is called “preventable,” the skill and attention of the medical officer or his qualified assistant could not be better employed than in this direction. The engagement of specially intelligent and reliable inspectors or nurses for this purpose has been resorted to, but, generally speaking, such a system is undesirable in practice. In many of the great towns this valuable class of work is entrusted to recently qualified medical assistants, who act as deputies of the medical officer, under whose orders and immediate supervision they carry on their work. In country districts, where distances are great, the authorities should be urged to freely provide their officer with facilities for locomotion, as by thus saving his time they

will be preventing infectious illness, and exercising economy in other ways. Furthermore, if, owing to largeness of area and multiplicity of engagements, medical officers for rural districts have found it beyond the limit of one man's capacity to make all the visits and inquiries they consider necessary, they have been allowed an assistant. There can be little doubt that such extra provision under special circumstances also conduces to efficiency and economy.

Sanitary Inspectors.

A most useful Directory has recently been published by the managers of an enterprising journal, named *The Medical Officer*. It contains particulars of the qualifications, appointments and salaries of sanitary inspectors in the United Kingdom. With the co-operation of William R. E. Coles, Esq., honorary secretary of the Government examination board for certificated sanitary inspectors, male and female, the writer has drawn up a classified table, summarizing the numbers of inspectors of different kinds and grades.¹ He has been intimately acquainted with this important part of Public Health organization, from the time of its rudimentary condition in 1872, to its present comparatively high state of development. He (the writer) is otherwise favourably situated for describing its sphere of operations, were it possible to do so now, having been closely associated with sanitary inspectors of all kinds for many years, and being himself now one of the members of the Government's honorary

¹ This table, in a somewhat crude and abbreviated form, appears in Appendix V. The chief points to which the figures direct attention at present are: 1. The large development of the Education Medical Department; 2. The small number of assistants to Medical Officers of Health; 3. The large development of the Sanitary Inspection Department; 4. The large increase in the numbers of women employed as Inspectors and in the valuable work of health visiting, especially in London.

examination board. That board, acting in conjunction with the Royal Sanitary Institute, has already been instrumental in introducing a special examination for food inspectors. It is now considering the question of having an analogous special examination and certificate for health visitors. Such a further development in the organization of sanitary inspectors' work is desirable on many grounds. The new fields of work that are opening up for women are not confined to factory and workshop inspections. The operation of the Midwives Act, the Notification of Births Act, and, above all, the Education Act, must not only afford opportunity for, but necessitate, the employment of women suitable on account of their character and intelligence with the addition of an essentially special training. It is the testing, approving and certification of this training that are now under consideration.

County Nursing Associations.

This would seem to be the appropriate place to briefly comment upon a comparatively new kind of organization in which ladies naturally take the most influential position. The need for co-ordination of the various agencies now at work in spreading information, affording nursing and other help to those who are really unable to provide for themselves, has been felt. It is in order to supply this deficiency or want that ladies and gentlemen of local influence have formed themselves into associations the work of which is superintended by the association for the whole county. The nurses to be superintended and inspected are of three different kinds. There is the "Cottage nurse," whose humble but very useful task it is to nurse the sick person, and, if it is the mother of the family that is ill or requiring attention in childbirth, to give domestic help as well; there is

the "Village nurse," who seldom resides in the patient's house, and who as well as being a certificated midwife has had a sufficiently long training to enable her to undertake the ordinary medical and surgical cases in which skilful nursing is such a boon to the sufferer; and, lastly, there is the "Visiting district nurse," of long hospital training and experience in the methods required by modern surgery in the case of operations, and who may work over a large area. It is the last-named nurse for whom the special certificate of the Government sanitary inspectors' examination board is contemplated. If certificated, she would be technically qualified for salaried employment under a County Council, a sanitary authority or a combination of sanitary authorities, and might be available for the supervision and guidance of the numerous Health Visitors and School Nurses. In addition to the above, there is the statutory inspection of midwives under the special Act by the local supervising authority, viz., the County Council. This supervision may be conducted for the authority, through the county medical officer, by the county nursing association. Much of the nursing work required in connection with school children under the county education authorities, health visiting, peripatetic health teaching, etc., may be arranged for in a similar way by co-operation with the county nursing association. So that a voluntary institution of this kind may in time become a powerful agency in Public Health administration, especially in that part of it where woman's guidance and help are most necessary. In connection with our own subject as already indicated, the absence of a central organization, even if it consists of nothing more than a bureau of information, is often experienced. For it happens that extra provision of fever nurses is required, now at one time and now at another, according to local exigencies and the shiftings of epidemic prevalence from one part of a district

to another, and at present there is no organization to facilitate transfer of staff. Some steps have already been taken with a view to affording this useful assistance to district councils and joint hospital boards within the area of the administrative county of Surrey.

In the metropolis and great towns of the United Kingdom, the voluntary hospitals—both general and special—with their brilliant staffs of physicians and surgeons, bacteriologists and teachers of all sorts, to whom are attached almost an army of keen intelligent students engaged, without pay, in tending suffering humanity, constitute a vast system which goes far towards reducing the need for home nursing. The splendidly equipped modern infirmaries erected under the provisions of the Poor Law go further still, and in the case of infectious diseases the hospitals of the Metropolitan Asylums Board are filled with patients treated gratuitously, but without any association with the idea of Poor Law relief. Still, even in great towns, there is besides the necessary midwives' inspection a growing need for developing home nursing, which in turn will lead to the establishment of superintending associations in which women will take the prominent part.

*Preventive Organization in London and the Great Towns
of the United Kingdom.*

The mere title of this sub-heading suggests much that is of public interest, but unfortunately this chapter has already exceeded in length the space allotted to it, and no more can be done than just to point out the position occupied by this highly important part of the whole body of organization.

The metropolitan boroughs hold quite an exceptional position in one respect, inasmuch as their officers are concerned with only parts of the great machinery of

preventive work. Their medical officers of health have, however, always, from the time when the areas were parishes and the authorities were vestries, exercised a great deal of influence in the development of Public Health. It would be difficult to dissociate this from such names as Simon, Burdon Sanderson, the elder Buchanan, Ballard, Bristow, Thomas Stevenson, Tidy, Corfield, Dudfield, Bate, Wynter Blyth, Sykes, Priestley, Sanders, Allan, Millson, Lovett, McCleary, Butler, and last, but not least, Louis Parkes of Chelsea, who is, at present, the holder of other important positions, including that of the chairmanship of the Council of the Royal Sanitary Institute. Much of the influence exercised by these gentlemen has been due to their having been in positions enabling them to express independent opinions, even though such opinions might at the time have been disrelished by the majorities of these authorities. As regards infectious diseases, inquiries into the history of cases, discovery of "carriers," and tracing of outbreaks to their sources form a part of their daily work; but the main part of this is taken off by the Metropolitan Asylums Board, who see after all the ambulance and hospital provision. That board has established several great isolation hospitals within and outside the area of the County of London, and at some of these teaching in the diagnosis and treatment of infectious diseases are carried on by physicians who are recognized as high authorities, such as Dr. Caiger, F.R.C.P., Dr. Goodall, Dr. McCombie, Dr. Bruce and others.

As regards the infectious diseases, the care of the large population of school children in London, as elsewhere, now belongs partly to the educational authorities, and it is in this connection that the principle of co-ordination has so often been referred to. No one can fail to recognize the importance of securing co-ordination in both county

and municipal work of all kinds. It may not, however, be inopportune, in connection with arrangements now being made for the purpose of securing so desirable an end, to advance a plea for consideration founded on services of the past. The Public Health Acts date back to 1872, whereas the Education Act became law not until 1902, *i.e.*, thirty years after. It is the fundamental work of all those previous years, chiefly devoted to communal hygiene, and which involved a constant warfare with insanitation in which the medical officer of health had to play the chief part, that has rendered possible all the immensely and deservedly popular work of educational and physical training. County councils themselves implied their indebtedness to the work that had already been accomplished when, twenty years ago, they showed themselves desirous of securing the appointment of men whose names were already well known in the sanitary service. A just appreciation of these facts is hopefully looked for at the present time.

Apart from London, it is in the great towns that local self-government reaches its highest development and most complete condition of co-ordination. Public water supply, drainage and sewage disposal, education, infectious hospital provision, laboratory work of all kinds, sanitary inspection—in short, every department of Public Health work is under the town council. The medical officership of health is deeply concerned with all these departments, and, therefore, the position is one of great importance as it is of high responsibility. It is indeed fortunate that for this department of medicine there have in the past been available the services of such men as the late Sir William Gairdner and Dr. James Burn Russell, followed by Dr. Chalmers and Dr. John C. MeVail of Glasgow, Sir Henry Littlejohn of Edinburgh, Dr. Haye of Aberdeen, Sir Charles Cameron, C.B., of Dublin,

Dr. Jno. Tatham, formerly of Manchester and afterwards of the General Register Office, Somerset House, Dr. Henry Armstrong of Newcastle, Dr. Niven of Manchester, Dr. Hope of Liverpool, Dr. Spottiswoode Cameron of Leeds, Dr. Robertson of Birmingham, Dr. Boobyer of Nottingham, Dr. Killick Millard of Leicester, and yet another brilliant administrative official, Dr. Davies of Bristol. The qualities required are not common, for besides being an expert in (or at least having a sound knowledge of) several branches of science, the successful medical officer of health for a large centre of population must in addition be the possessor of good business capacity and power of organization.

County Medical Officers of Health.

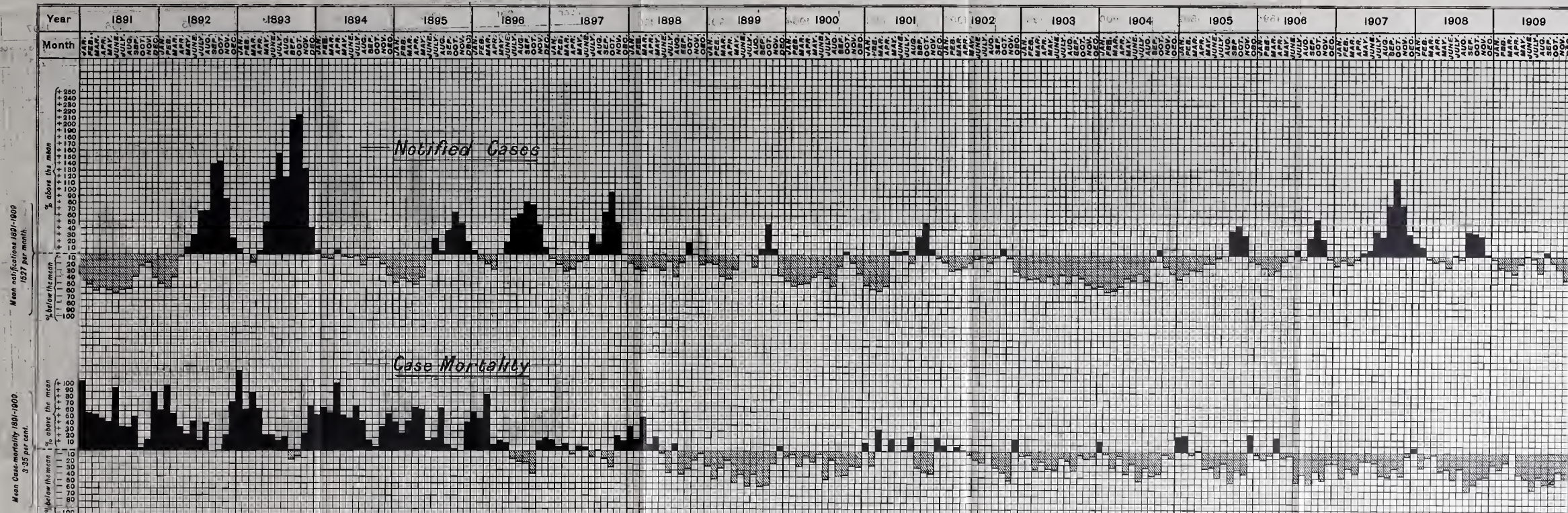
There only now remains space for a very few words respecting the appointments which were first made by county councils desirous of taking the lead in the development of Public Health administration. The actual legal powers conferred by the Local Government Act, 1888, except, of course, in the case of the London County Council, which succeeded to the position of the old Metropolitan Board of Works, were of a somewhat limited nature. But the opportunities for promoting large improvements through the exercise of tact and discrimination by these officials proved considerable. This is prominently shown by the great improvements effected in small town and country districts in water supply, drainage, and generally in the preventive treatment of infectious diseases.

Reference has already been made to the desire of certain County Councils to obtain the advice and assistance of experienced Medical Officers of Health at the outset, *i. e.*, in 1889 and 1890. Fifteen years later—*i. e.*, in 1905—the position became complicated by the operation of the Education and Midwives Acts, which involved various

executive duties and central official organization. Later on—*i. e.*, in 1910—came the Housing and Town Planning Act, which established the position of Medical Officers of Health generally.

The County Councils Association is likely to become a powerful body in the future, as it is represented by the chairmen and most prominent members of each County Council in England, and as, moreover, it is assisted by the presence of three highly representative Medical Officers of Health, *viz.*: Dr. George Reid of Staffordshire, Dr. Bostock Hill of Warwickshire, and Dr. Kaye of the West Riding of Yorkshire.

SCARLET FEVER. LONDON SERIES. SHOWING PROPORTION OF NOTIFIED CASES AND THE CASE-MORTALITY.





1900

APPENDIX I

COMPARATIVE INCIDENCE OF SCARLET FEVER IN SURREY DISTRICTS

THE following Notes supply information in relation to the Series of Charts showing the Notification Case-rate per 1,000 of the Population, shown by the Height of the Column Year by Year in each District for the Period of Thirteen Years, 1895-1907.

In all but two of the districts hospital accommodation is provided, directly or indirectly. By directly is meant that the district has a hospital of its own, as at Barnes and Wimbledon, or in combination with one or more other districts as at Richmond (the Richmond and Isleworth Joint Hospital) or Esher, Malden and Surbiton (the Tolworth Joint Hospital). By indirectly is meant that districts have made arrangements with the authorities of other hospital-provided districts for the reception of their cases under specified conditions, as at Kingston-on-Thames, where cases which it is considered specially desirable to isolate used to be sent to the Croydon Borough Hospital at Waddon and are now sent to Hampton in Middlesex.

For the most part the directly provided district authorities aim at isolating all the cases notified in which hospital isolation is applied for or recommended, which practically amounts to the removal of all cases from tenement and lodging houses, artisans' and labourers' dwellings and cottages. The belief prevails generally that the authority,

whether district council or joint hospital board, having once established a hospital, is under legal obligation to provide isolation for any ratepayer who requires it within the area. But this view may not be correct.

As regards the indirectly provided districts, Kingston is a very select isolater. The Hambleton authority is also only a partial isolater. (See Report of Dr. Theodore Thomson, C.M.G., to the Local Government Board in 1907.)

The districts of Egham and Molesey have relied on notification and such measures as are practicable without hospitals. The latter district has attempted a system of home nursing. It is now provided with a hospital of its own.

The following is a list of the districts with the several separate or joint hospitals available for their use :—

Barnes.—A well-administered hospital at Mortlake.

Richmond.—A good hospital in combination with Isleworth at Mogden.

Wimbledon.—A good modern hospital in the Gap Road.

Kingston.—Access formerly to the Croydon Borough Hospital at Waddon, and now to the Hampton District Hospital in the County of Middlesex.

Esher, Malden and Surbiton.—The Tolworth Hospital, which has recently been enlarged with modern improvements.

Chertsey (Urban and Rural), Weybridge and Walton.—The Ottershaw Hospital.

Farnham Urban and Rural.—The Wrecclesham Hospital.

Frimley.—A small hospital of its own.

Hambleton.—Access to Wrecclesham Hospital.

Guildford (Borough and Rural), Godalming (Borough) and Woking.—The Stoke Hospital. One of the original County Institutions.

Dorking (Urban and Rural).—Westcott Hospital.

Accommodation limited, the district being sparsely populated.

Leatherhead, Epsom (Rural), Sutton and Carshalton.—The Cuddington Hospital.

Epsom Town.—Hospital of its own near the sewage farm.

Croydon Rural.—Well-appointed hospital at Beddington.

Reigate Borough.—Well-appointed hospital at Earlswood.

Reigate Rural.—Separate hospital of its own immediately adjoining that of the borough.

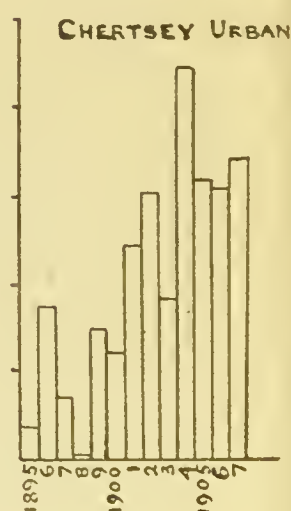
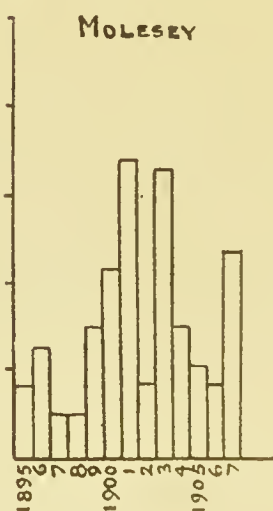
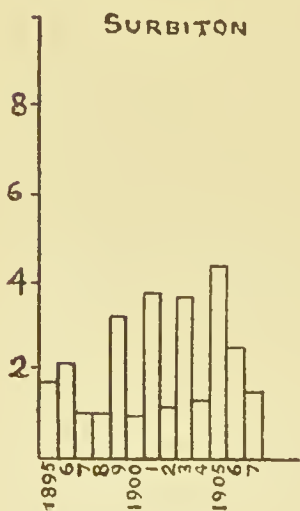
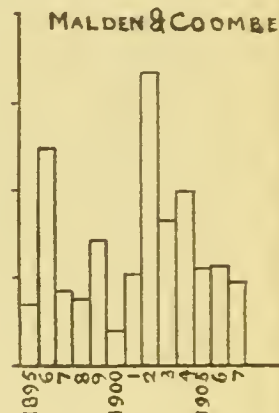
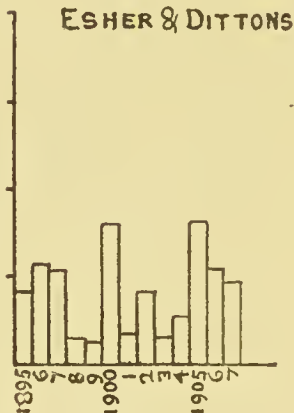
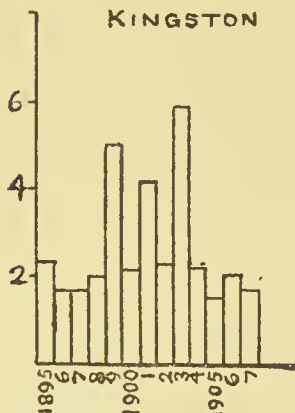
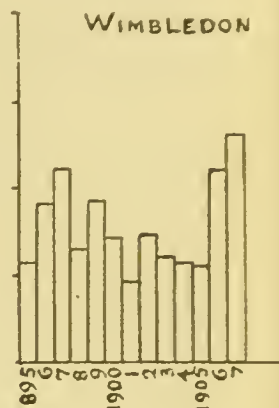
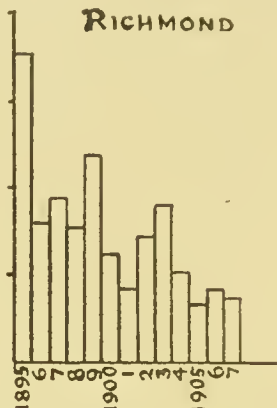
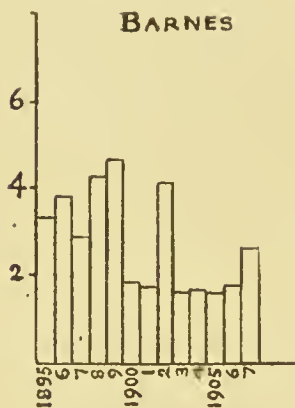
Godstone.—Hospital of its own at Bletchingley. Caterham has access to the Croydon Rural Hospital, at Beddington Corner, but the notification returns are included in the Godstone table of statistics and chart.

There are consequently 15 ordinary isolation hospitals—that is, hospitals available for scarlet fever, diphtheria and typhoid (enteric) fever in the county. There are also, now, special smallpox hospitals. So that the county is fairly well provided in comparison with other counties.

In presenting these charts, it should be explained that every possible care has been taken to avoid any source of error. The calculations have been checked in different ways, and where discrepancies have been found in the estimates of the returns or the reports of the medical officers of health presented every year to the district councils, the reasons for these differences have been discovered and explained. In this work, we had at first the valuable advice and assistance of the late Dr. Jacob, and several other medical officers of health assisted very materially in their preliminary discussion. The charts were freely circulated amongst them during a whole year, so we thus had the advantage of any criticism that might be raised,

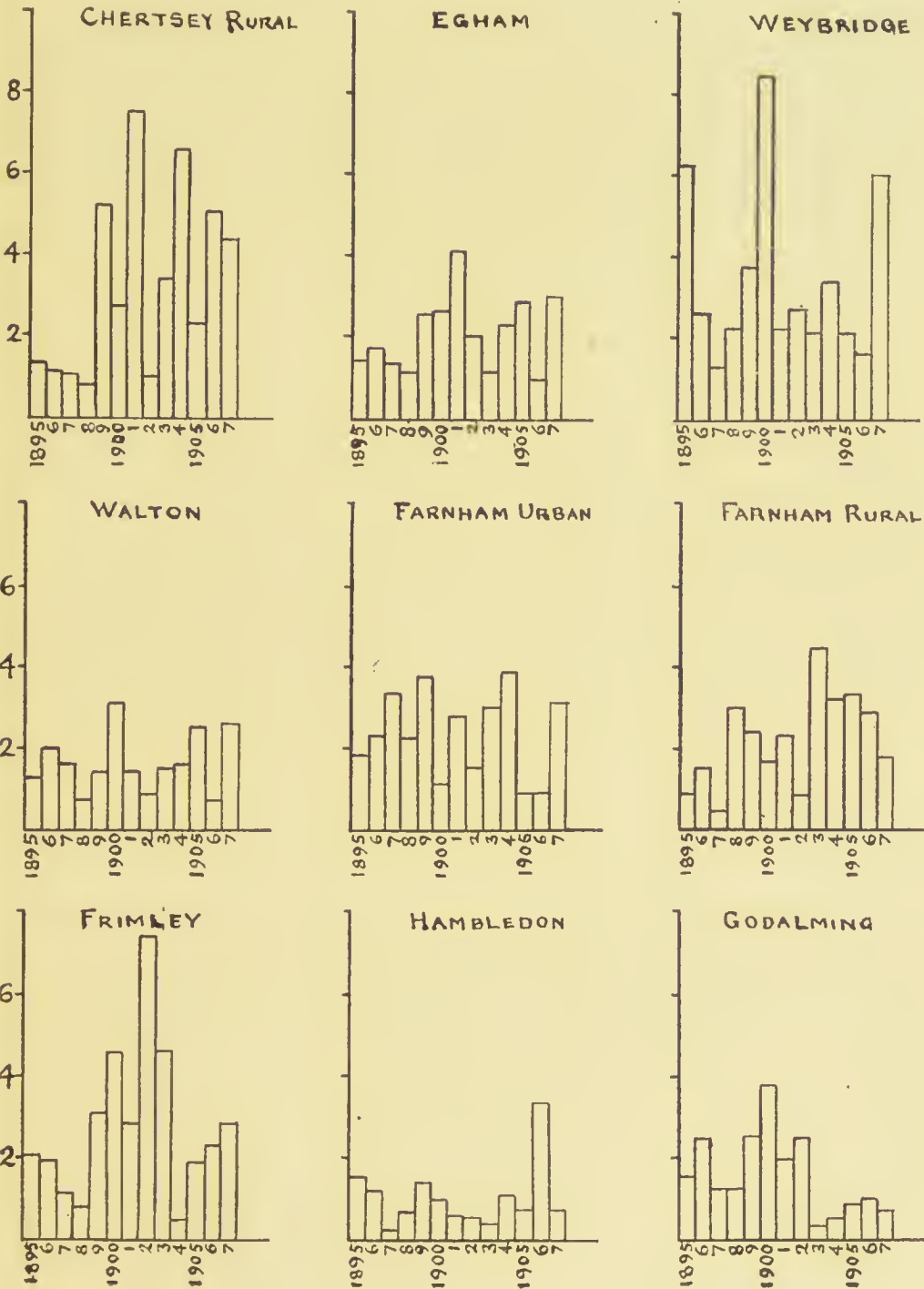
ADMINISTRATIVE COUNTY OF SURREY

SCARLET FEVER NOTIFICATION CASE-RATE PER 1,000 OF THE POPULATION SHOWN BY THE HEIGHT OF THE COLUMN YEAR BY YEAR IN EACH DISTRICT FOR THE PERIOD OF 13 YEARS 1895-1907.



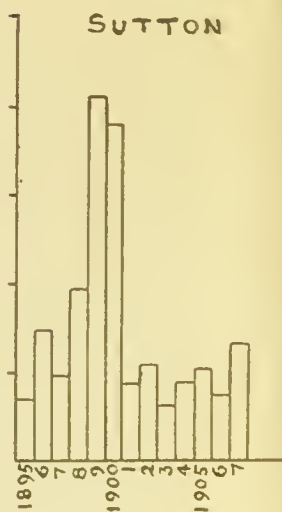
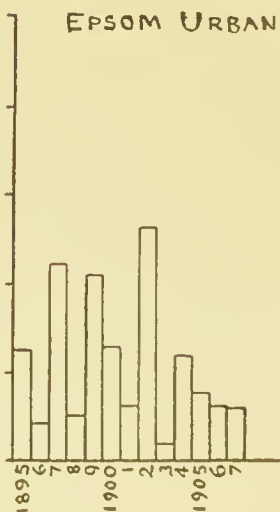
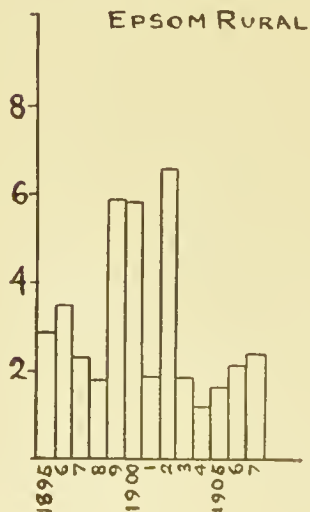
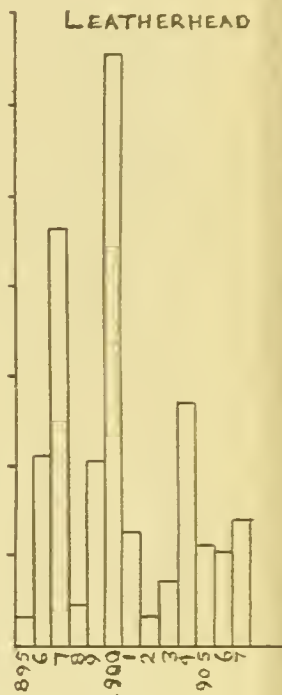
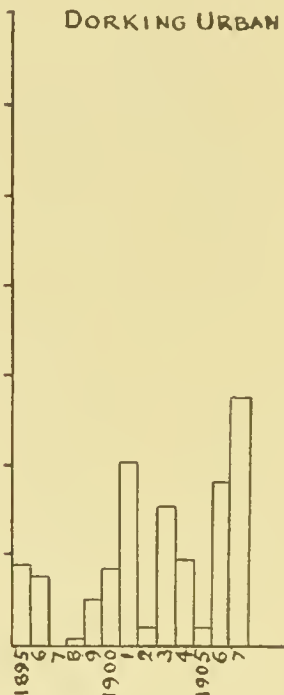
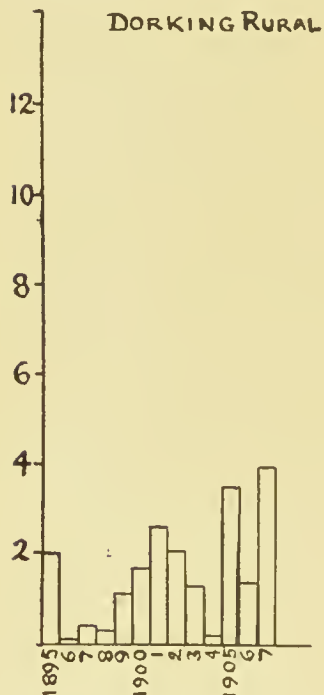
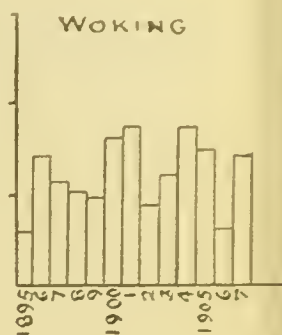
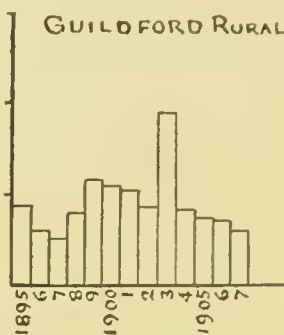
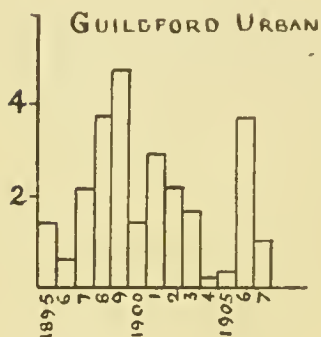
ADMINISTRATIVE COUNTY OF SURREY

SCARLET FEVER NOTIFICATION CASE-RATE PER 1,000 OF THE POPULATION SHOWN BY THE HEIGHT OF THE COLUMN YEAR BY YEAR IN EACH DISTRICT FOR THE PERIOD OF 13 YEARS 1895-1907.



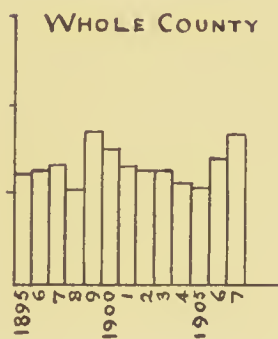
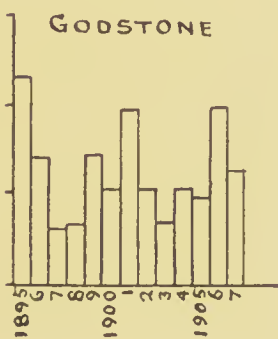
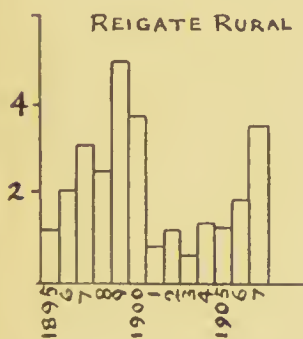
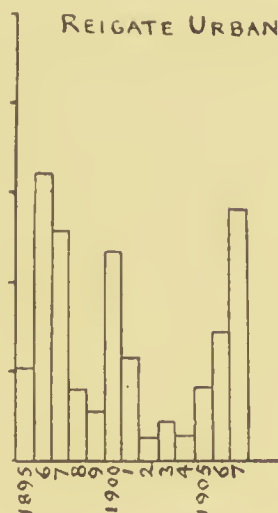
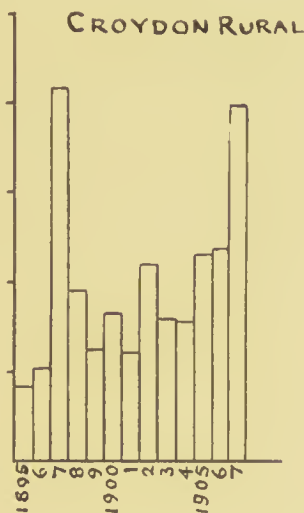
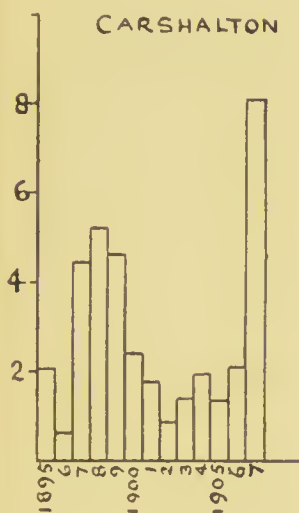
ADMINISTRATIVE COUNTY OF SURREY

SCARLET FEVER NOTIFICATION CASE-RATE PER 1,000 OF THE POPULATION SHOWN BY THE HEIGHT OF THE COLUMN YEAR BY YEAR IN EACH DISTRICT FOR THE PERIOD OF 13 YEARS 1895-1907.



ADMINISTRATIVE COUNTY OF SURREY

SCARLET FEVER NOTIFICATION CASE-RATE PER 1,000 OF THE POPULATION SHOWN BY THE HEIGHT OF THE COLUMN YEAR BY YEAR IN EACH DISTRICT FOR THE PERIOD OF 13 YEARS 1895-1907.



APPENDIX II

SECONDARY AND RETURN CASES OF SCARLET FEVER

THE following notes show the method of classification of the cases and other necessary details.

Epsom and Dorking Combined District

Scarlet Fever, 1891-1905.

The district consists of the Carshalton, Dorking, Epsom and Leatherhead Urban districts, and the Dorking and Epsom Rural districts.

Notification has been in force throughout the whole period, and full records have been kept, the particulars as regards dates of attack, etc., having been ascertained in almost all cases by the Medical Officer of Health on personal visits to the houses.

The figures in the tables are those of all cases of scarlet fever notified in private houses in the fifteen years. Cases in public institutions and schools have been excluded.

In comparing the results of the system of "home isolation," the mode of treatment of the first case in the house has been taken to designate the class to which the cases belong. The classification depends entirely on whether the first case was removed to hospital or not. If not, the cases are classified as "home cases." It is the *system* of notification *with* hospital isolation as compared with that of notification *without* hospital isolation which is being tested at this stage of our inquiry. In

view of what will appear later on, it is well to emphasize this fact. There are very few cases that do not admit of being classified in the above way. But among the few variations from the general rule it may be mentioned that out of the 2,327 cases there were in the whole period 18 secondary cases in "home" houses removed to hospital, and, on the other hand, 21 secondary cases in "hospital" houses were nursed at home.

Hospital accommodation for the Epsom Rural and Leatherhead districts has been available throughout; a temporary hospital from 1891 to 1897, and the Cuddington Joint Hospital since the autumn of 1897; Carshalton patients have been removed to the latter hospital since that time. The Epsom Urban Isolation Hospital was opened in September, 1894. There was no accommodation for the Dorking districts until the beginning of 1903, when the Westcott Hospital was opened.

Statistical Summary.

In the whole period there were 2,327 cases in 1,539 houses, and 1,133 patients were removed.

Case-rate per 1,000 of mean population was 2·8.

Case-rate per house was 1·51, and 48·5 per cent. of the patients were removed.

Secondary cases occurred in 28·6 per cent. of houses invaded.

A comparison of the rates in the three quinquennia shows a progressive decrease in the case-rate per 1,000, the case-rate per house invaded, and the percentage of houses in which secondary cases occurred.

	Case-rate per 1,000 population.	Cases per house.	Per cent. houses having secondary cases.
1891-1895	3·78	1·66	34·1
1896-1900	2·78	1·44	27·6
1901-1905	1·93	1·38	22·5

Home-treated cases.—There were 1,194 cases in 763 houses; 782 of the cases (65 per cent.) occurred in the

first quinquennium, 550 or 46 per cent. in the Dorking districts in that period.

The quinquennial figures were :—

	Cases.	Rate per house.	Per cent. houses having multiple cases.
1891-1895	782	1·71	35·4
1896-1900	218	1·35	24·5
1901-1905	194	1·34	22·6
Whole period	1,194	1·56	

Hospital-treated cases.—There were 1,133 cases in 776 houses, a case-rate per house of 1·46, and secondary cases occurred in 26·6 per cent. of houses invaded.

The quinquennial figures were :—

	Cases.	Rate per house.	Per cent. houses having multiple cases.
1891-1895	193	1·51	29·0
1896-1900	550	1·48	28·9
1901-1905	390	1·40	22·4
Whole period	1,133	1·46	

Results indicated by the Charts.

These figures showed no such advantage in the system of hospital isolation as might be expected, and diagrams were accordingly constructed in order to compare the sequence of events during the six months following the date of attack of the first patient in each house, in the houses included in the two series.

The first tables were prepared by allotting the secondary cases in each house to the week in which the secondary attack occurred, dating from the first attack. From the data thus obtained, the numbers of secondary cases proportionate to 1,000 houses invaded, were calculated upon the basis of the numbers of houses invaded in each of the two series.

Charts *a* and *b*, pp. 193 and 194, show the results in the case of the “home” and “hospital” series respectively.

Chart *a*, p. 193, is to be read as follows, viz., per 1,000 houses invaded, 209 secondary cases occurred in the first

week from date of attack of the first patient, 132 cases in the second week, and so on; similarly Chart *b*, p. 194, reads, per 1,000 houses invaded, 199 secondary cases occurred in the first week, 79 in the second, and so on.

In order to eliminate the factor of a larger proportion of cases in better-class houses being nursed at home, making the comparison unfair to the "hospital" group, similar tables and diagrams of cases occurring in cottages only were prepared. These charts lettered *c* and *d*, pp. 195 and 196, are to be read in the same manner as Charts pp. 193 and 194.

A comparison of the charts shows that, in the first week, the results in all cases are similar, about 200 secondary cases occurring in each group per 1,000 houses; the "hospital" group then shows an increasing advantage for several weeks, until the seventh week, when secondary cases have almost disappeared. In the eighth week there is a rise in the "hospital" group, which steadily increases up to the twelfth week but still continues for several weeks longer. This rise no doubt indicates the "return cases." This group, viz., cases of recrudescent infectivity analogous to those of hospital "return cases," is perhaps represented in the "Home" chart by a proportion of the cases occurring after the sixth week, but, if so, it is to a much smaller extent and occurs at an earlier period.

The "hospital" charts indicated that a very high percentage of the secondary cases were infected before the removal of the first patient, and the dates of attack were accordingly tabulated and charted in relation to the removal. The "home" cases were similarly treated in relation to notification. Charts *e* and *f*, pp. 197 and 198, represent the results.

Chart *e*, p. 197, shows that *a large proportion of secondary cases had occurred before the first removal*, while in the following week many patients failed, who had been

probably infected before the removal. These two groups together compose two-thirds of the secondary cases. Chart *f*, p. 198, similarly shows that about 60 per cent. of the secondary cases had been infected before notification, *i. e.*, before precautions were taken.

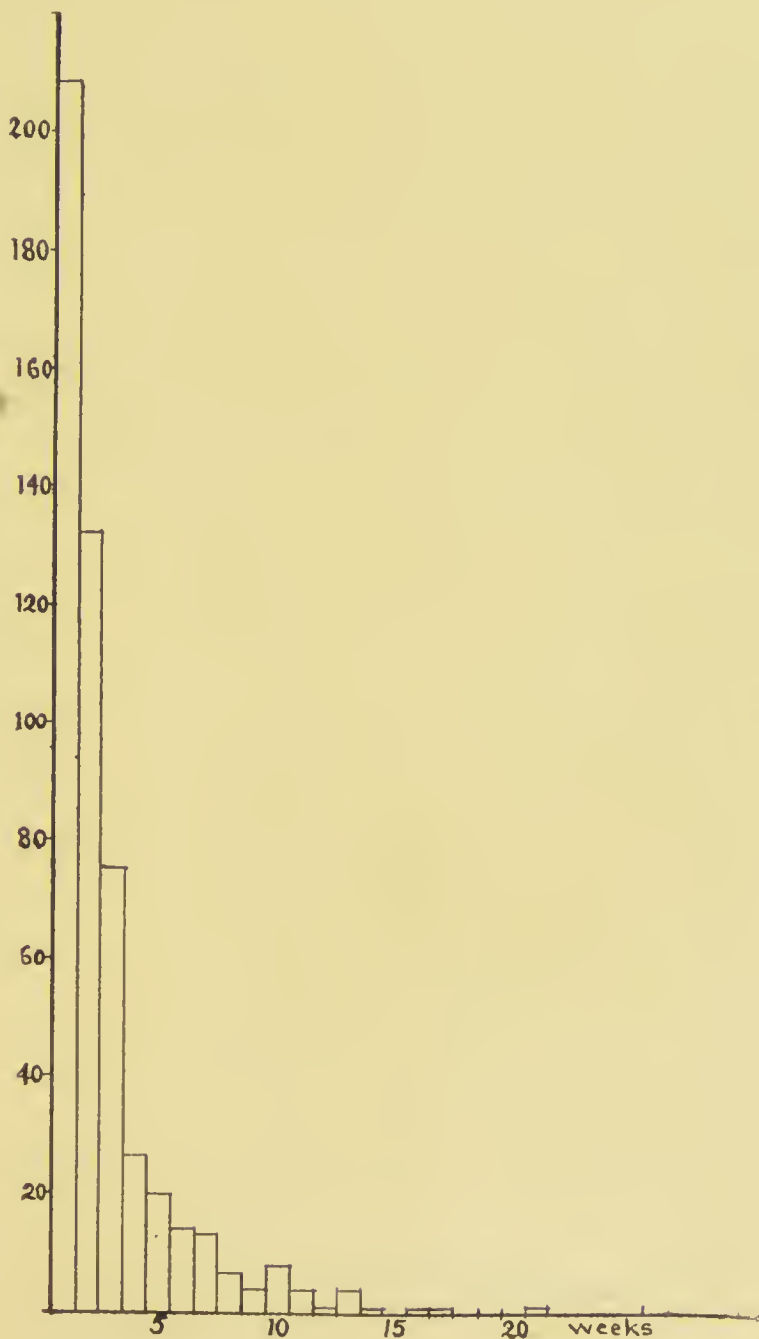
ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

SCARLET FEVER, 1891-1905

(a) HOME CASES

SECONDARY CASES OCCURRING IN EACH WEEK FROM DATE OF ATTACK OF
PRIMARY CASE, PER 1,000 HOUSES INVADDED (BASED ON 763 HOUSES)



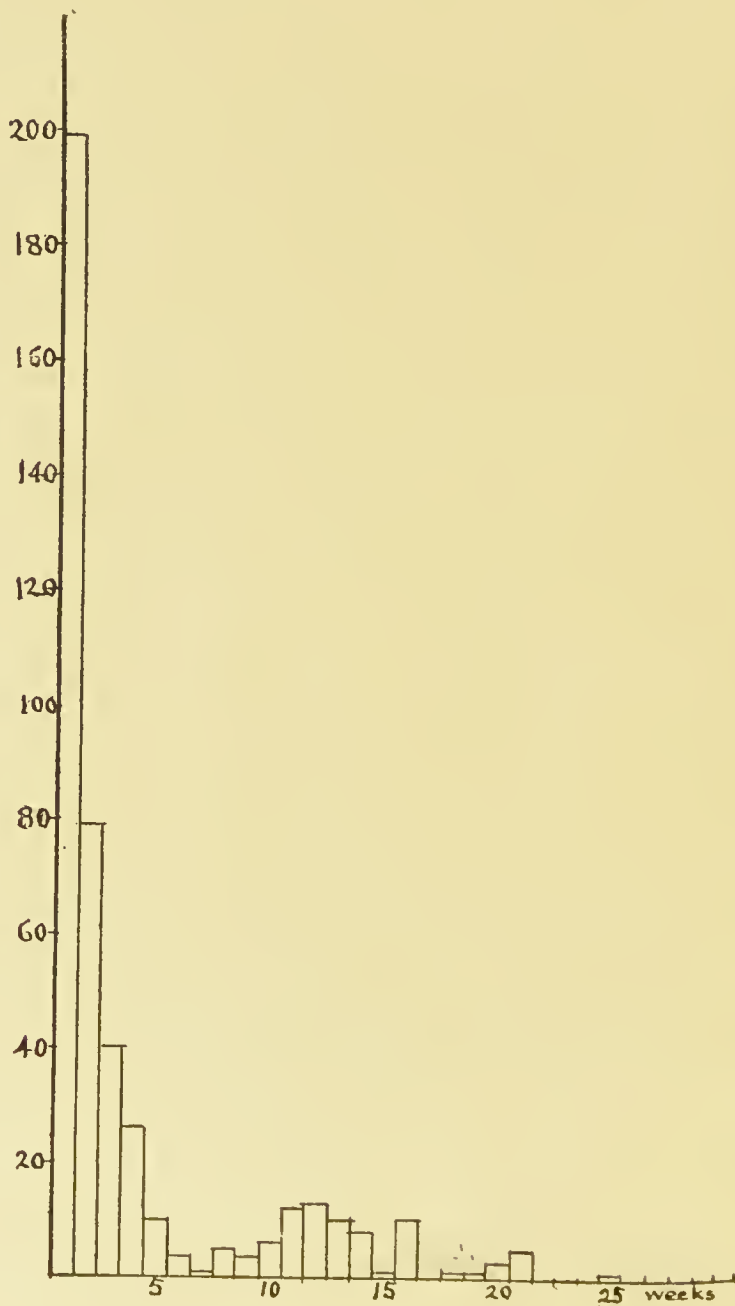
ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

SCARLET FEVER, 1891-1905

(b) HOSPITAL CASES

SECONDARY CASES OCCURRING IN EACH WEEK FROM DATE OF ATTACK OF
PRIMARY CASE, PER 1,000 HOUSES INVADIED (BASED ON 776 HOUSES)



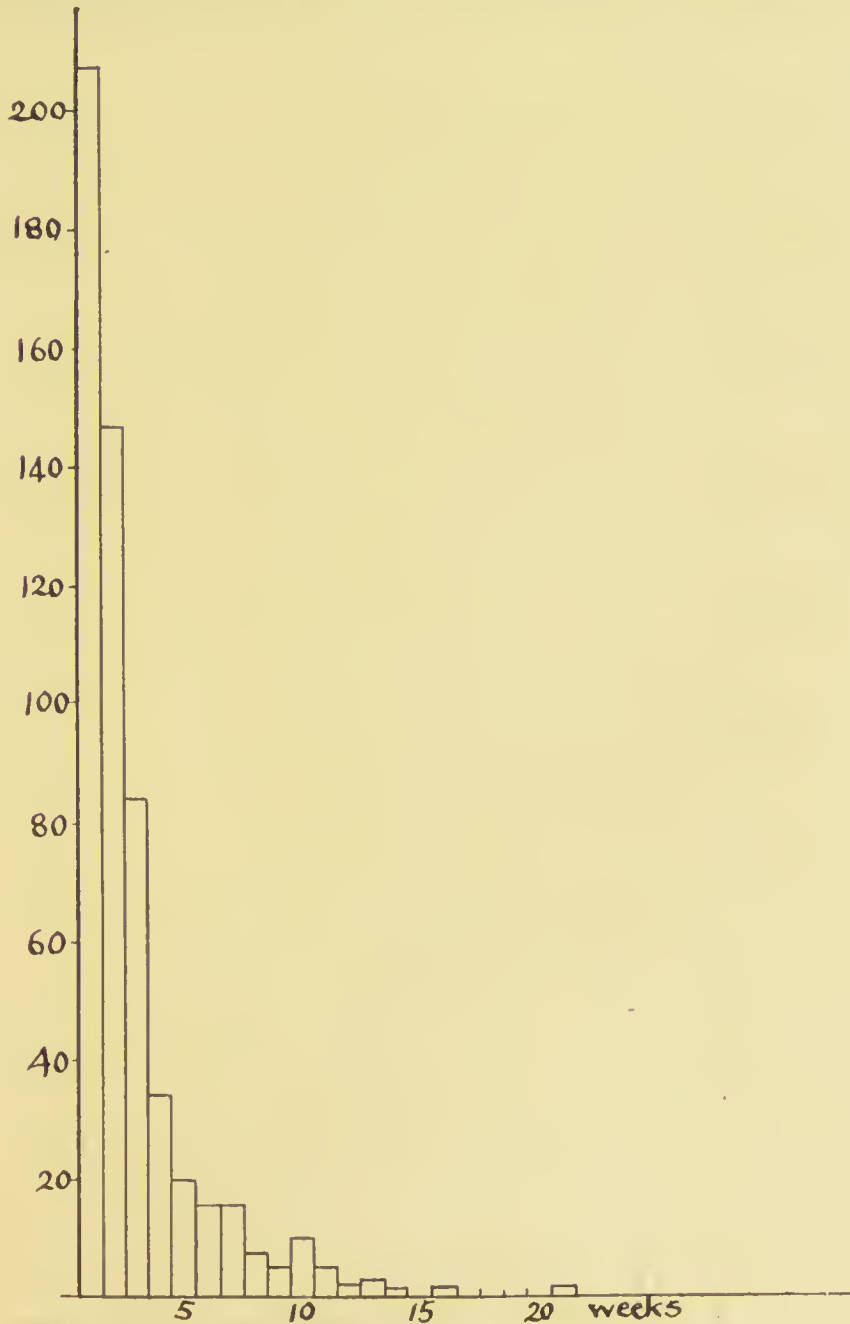
ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

SCARLET FEVER, 1891-1905

(c) HOME CASES

(COTTAGES ONLY)

SECONDARY CASES OCCURRING IN EACH WEEK FROM DATE OF ATTACK OF
PRIMARY CASE, PER 1,000 HOUSES INVADDED (BASED ON 592 HOUSES)

ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

SCARLET FEVER, 1891-1905

(d) HOSPITAL CASES

(COTTAGES ONLY)

SECONDARY CASES OCCURRING IN EACH WEEK FROM DATE OF ATTACK OF
PRIMARY CASE, PER 1,000 HOUSES INVADDED (BASED ON 685 HOUSES)

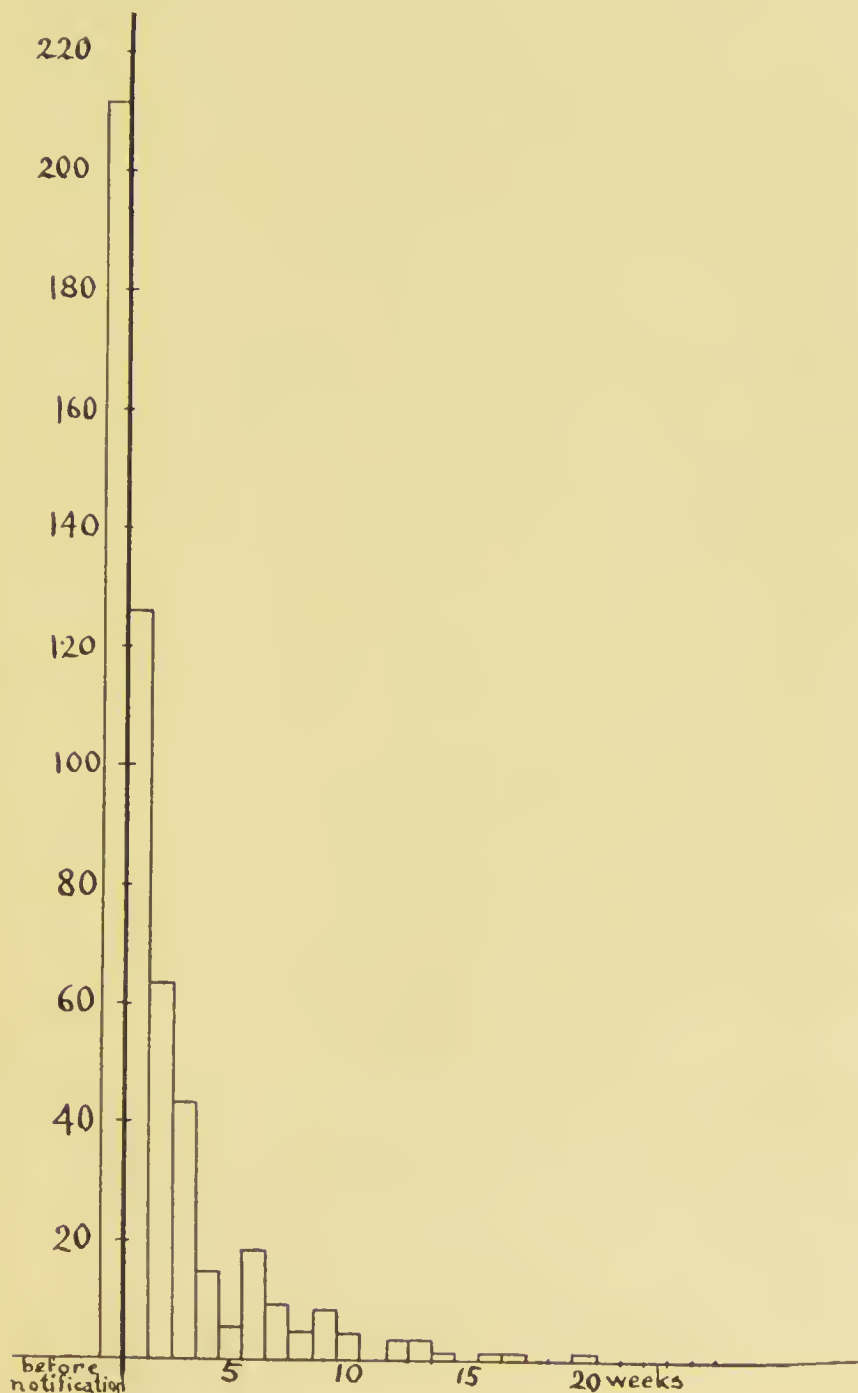
ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

SCARLET FEVER, 1891-1905

(e) HOME CASES

SECONDARY CASES OCCURRING IN EACH WEEK BEFORE AND AFTER DATE OF
NOTIFICATION OF PRIMARY CASE PER 1,000 HOUSES INVADIED (BASED ON
763 HOUSES)



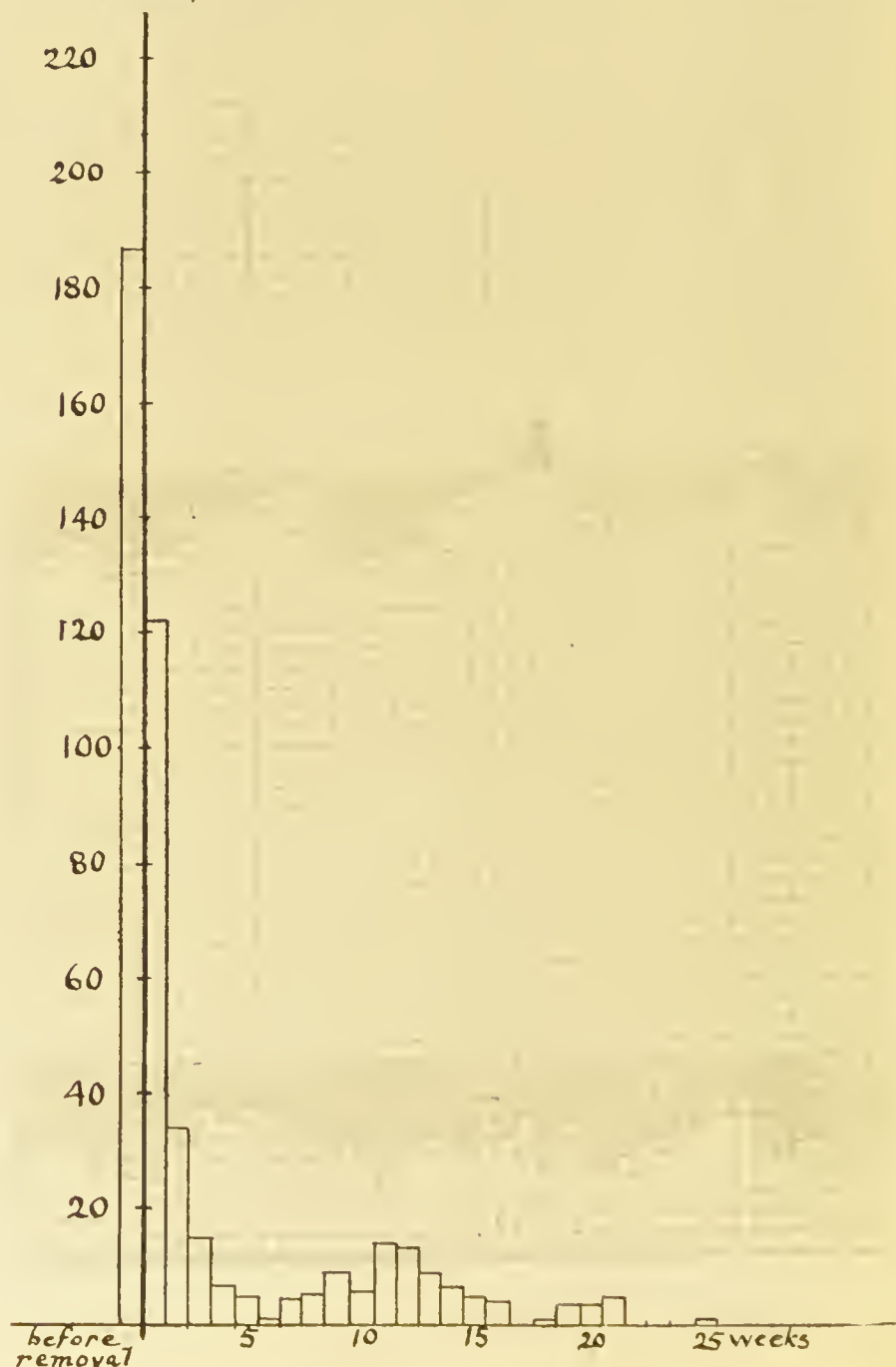
ADMINISTRATIVE COUNTY OF SURREY

EPSOM AND DORKING COMBINED DISTRICT

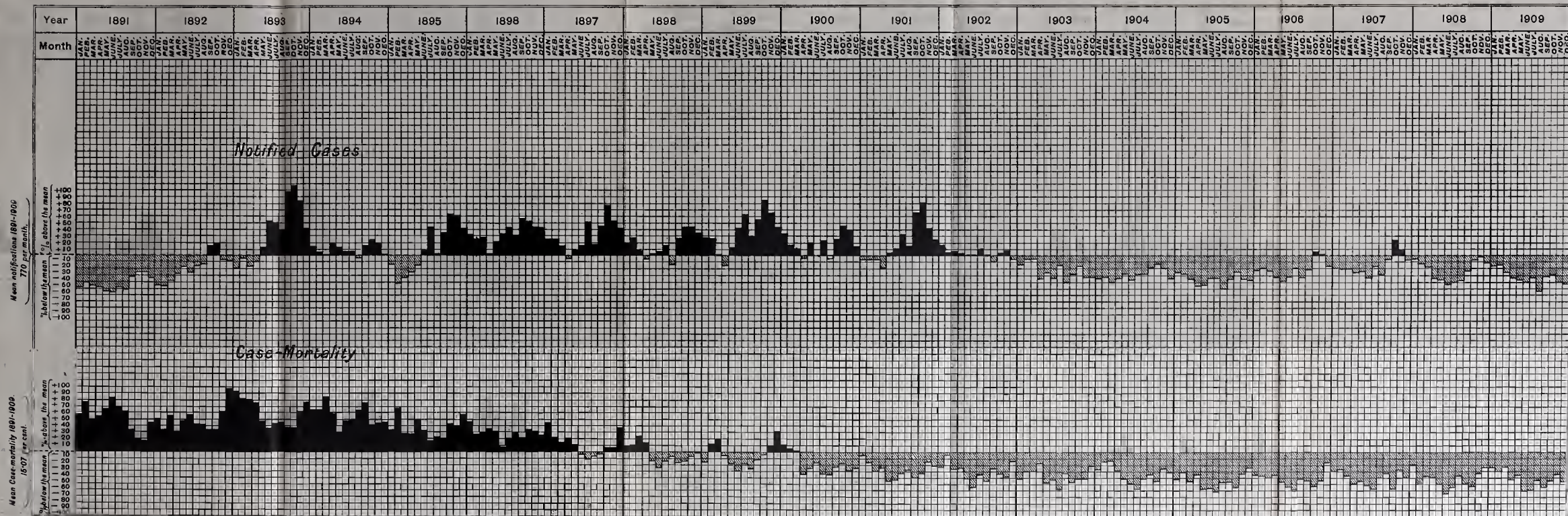
SCARLET FEVER, 1891-1905

(f) HOSPITAL CASES

SECONDARY CASES OCCURRING IN EACH WEEK BEFORE AND AFTER DATE
OF REMOVAL OF PRIMARY CASE, PER 1,000 HOUSES INVADED (BASED ON
776 HOUSES)



DIPHTHERIA. LONDON SERIES. SHOWING PROPORTION OF NOTIFIED CASES AND THE CASE-MORTALITY



APPENDIX III

SURREY SERIES. TYPHOID CHARTS

ADMINISTRATIVE COUNTY OF SURREY

DIAGRAM SHOWING A GENERAL VIEW REDUCED FROM THE SEVERAL
YEARLY CHARTS RELATING TO TYPHOID FEVER & RAINFALL IN THE

SEVEN YEARS 1900 TO 1906

1900 | 1901 | 1902 | 1903 | 1904 | 1905 | 1906

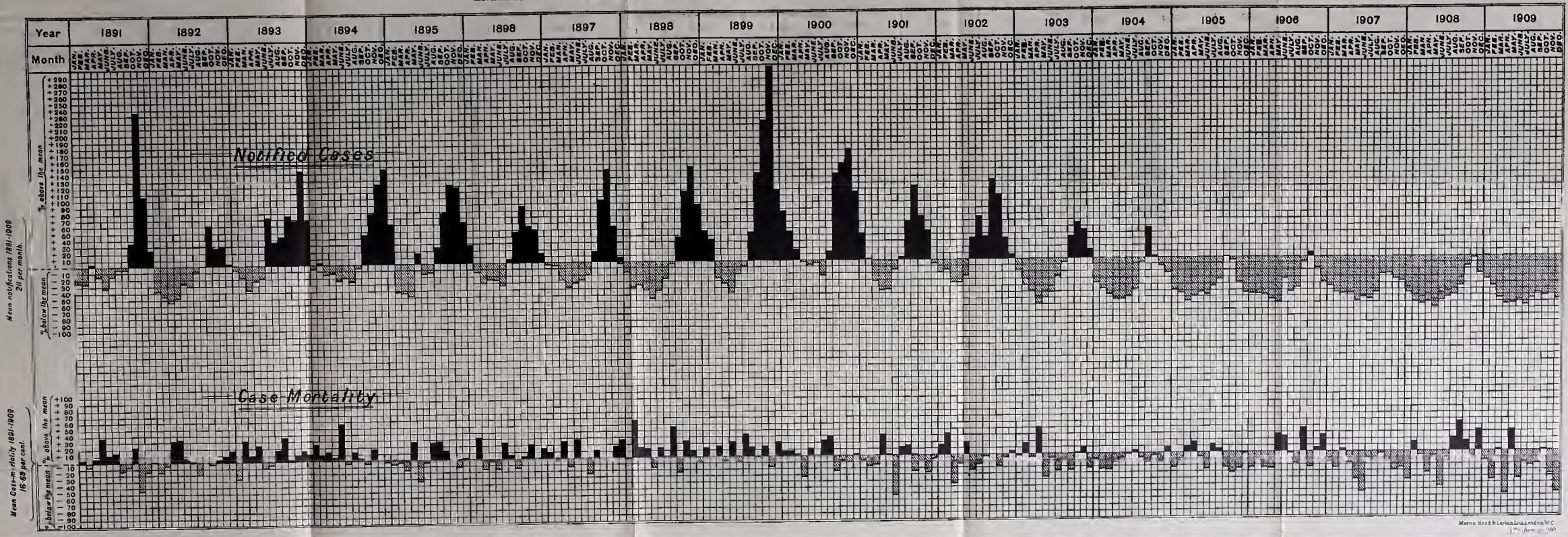
DISTRICT 1 (MAINLY WITHIN THE AREA OF RIVER WATER SUPPLY)

DISTRICT 2 (MAINLY WITHIN THE AREA OF SAND WATER SUPPLY)

DISTRICT 3 (MAINLY WITHIN THE AREA OF CHALK WATER SUPPLY)

RAINFALL / TYPHOID FEVER ▲

ENTERIC. LONDON SERIES. SHOWING PROPORTION OF NOTIFIED CASES AND THE CASE-MORTALITY.



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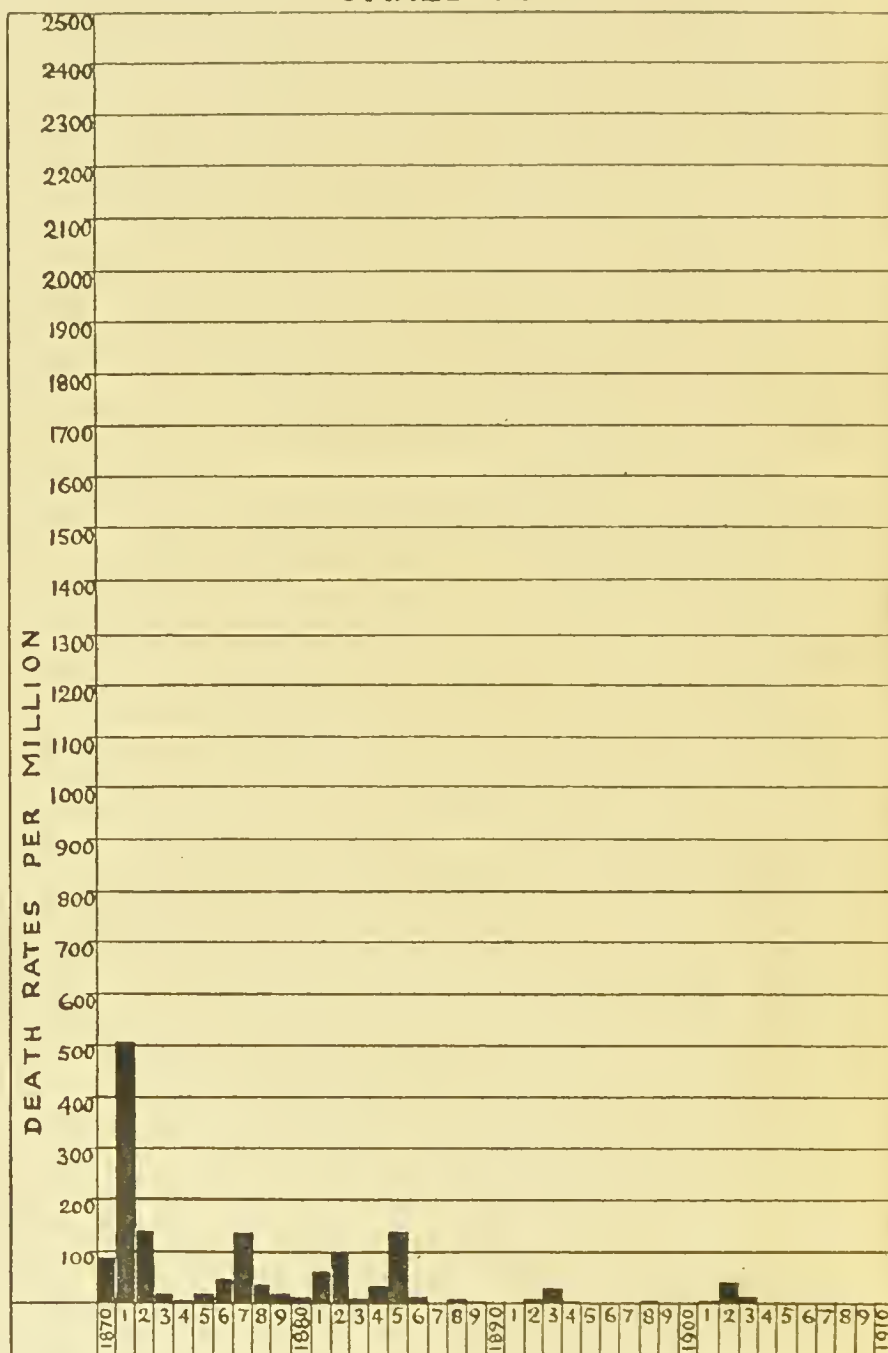


APPENDIX IV

SURREY SERIES. SMALLPOX CHARTS

SURREY

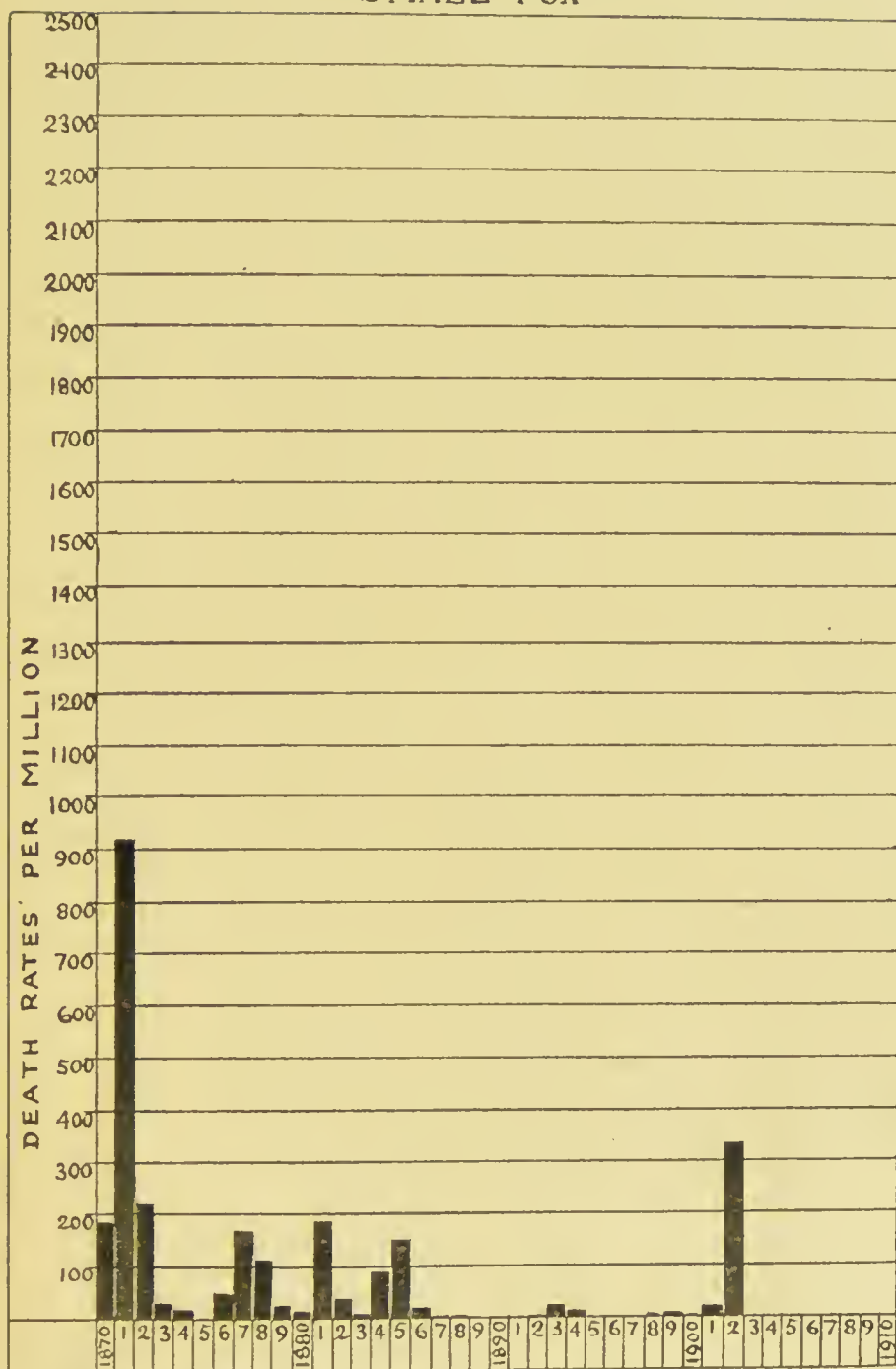
SMALL-POX



Showing the death-rate per million persons living for the years 1870-1910.

MIDDLESEX

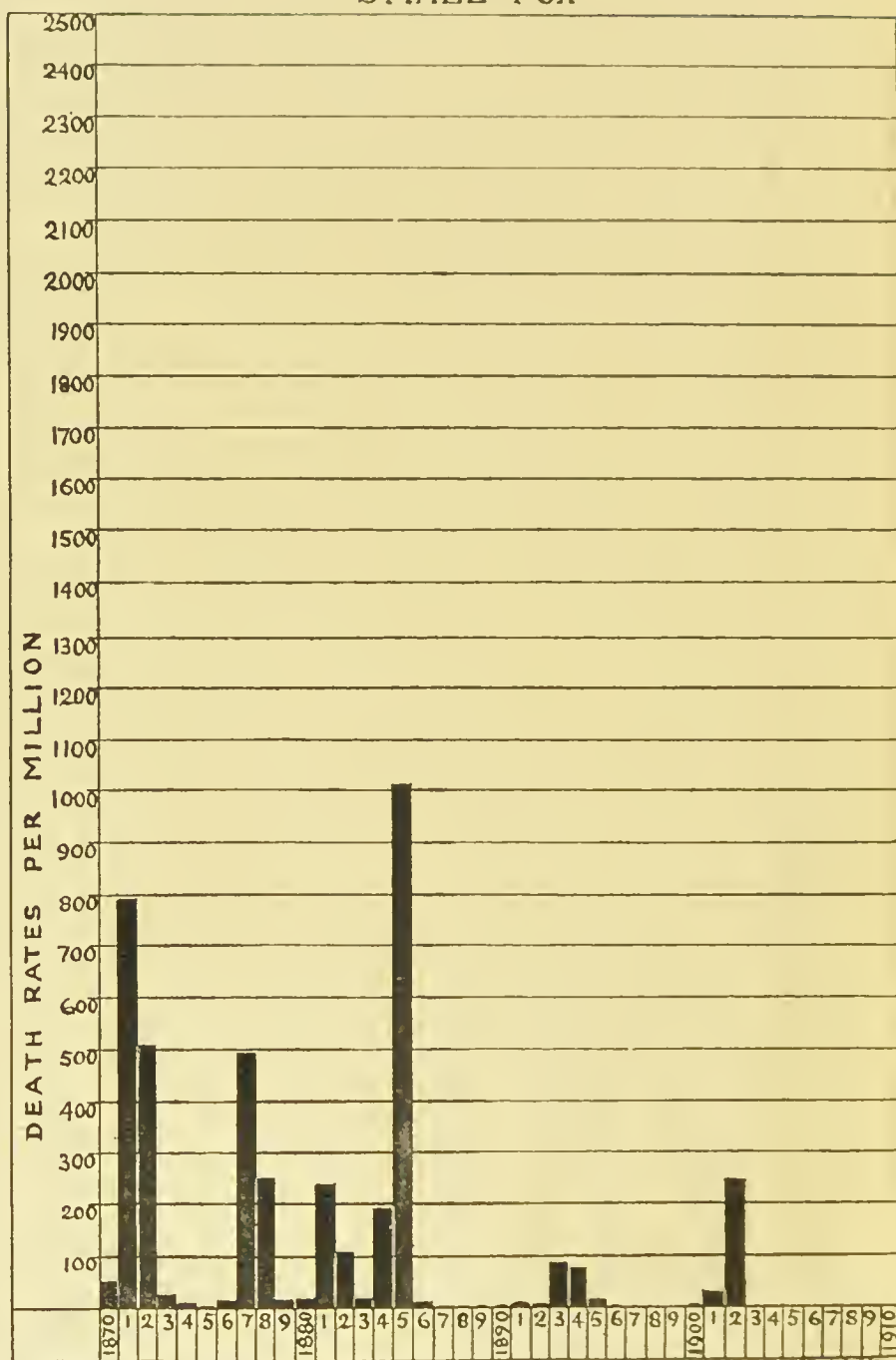
SMALL-POX



Showing the death-rate per million persons living for the years 1870-1910.

ESSEX

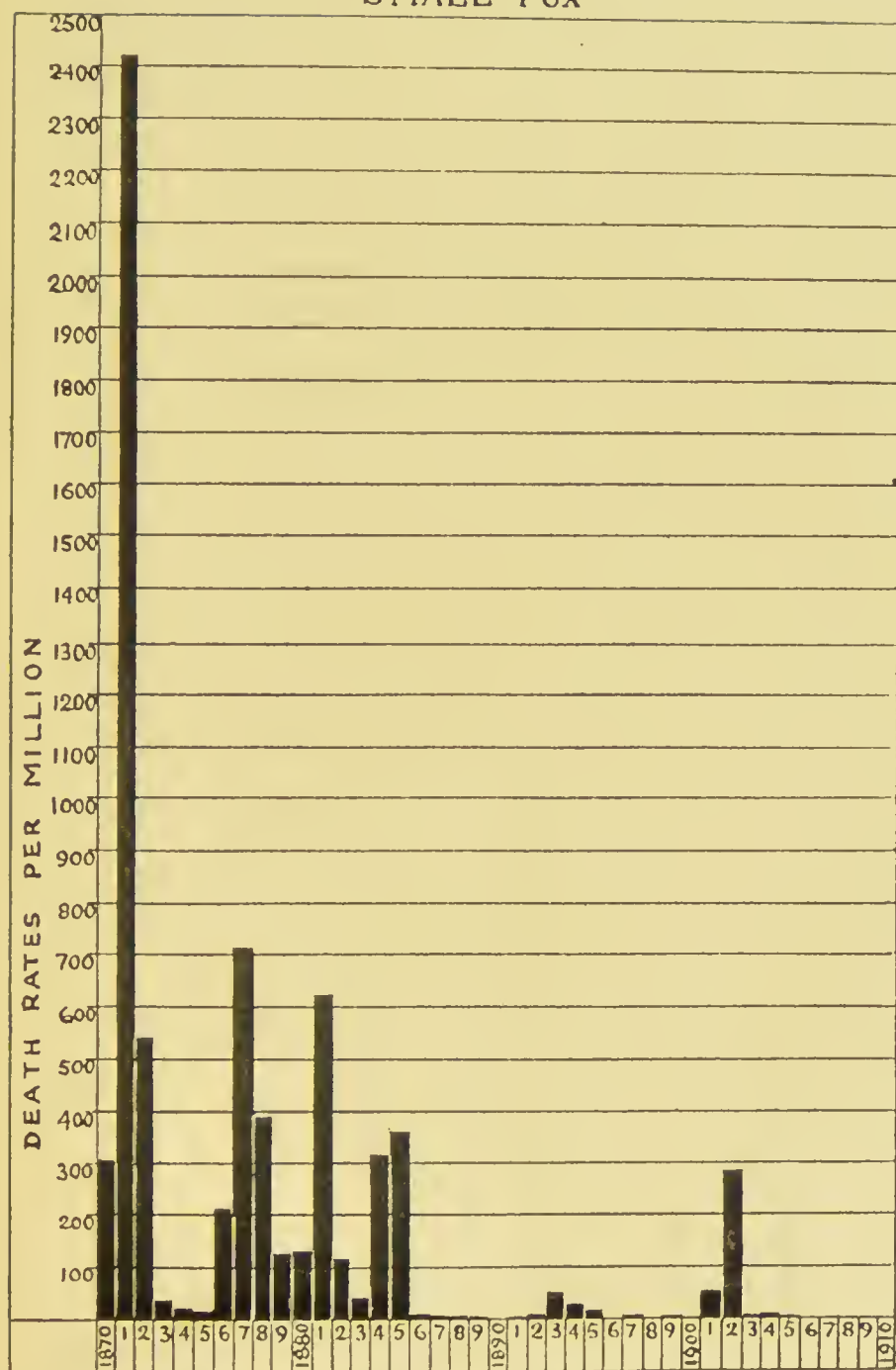
SMALL-POX



Showing the death-rate per million persons living for the years 1870-1910.

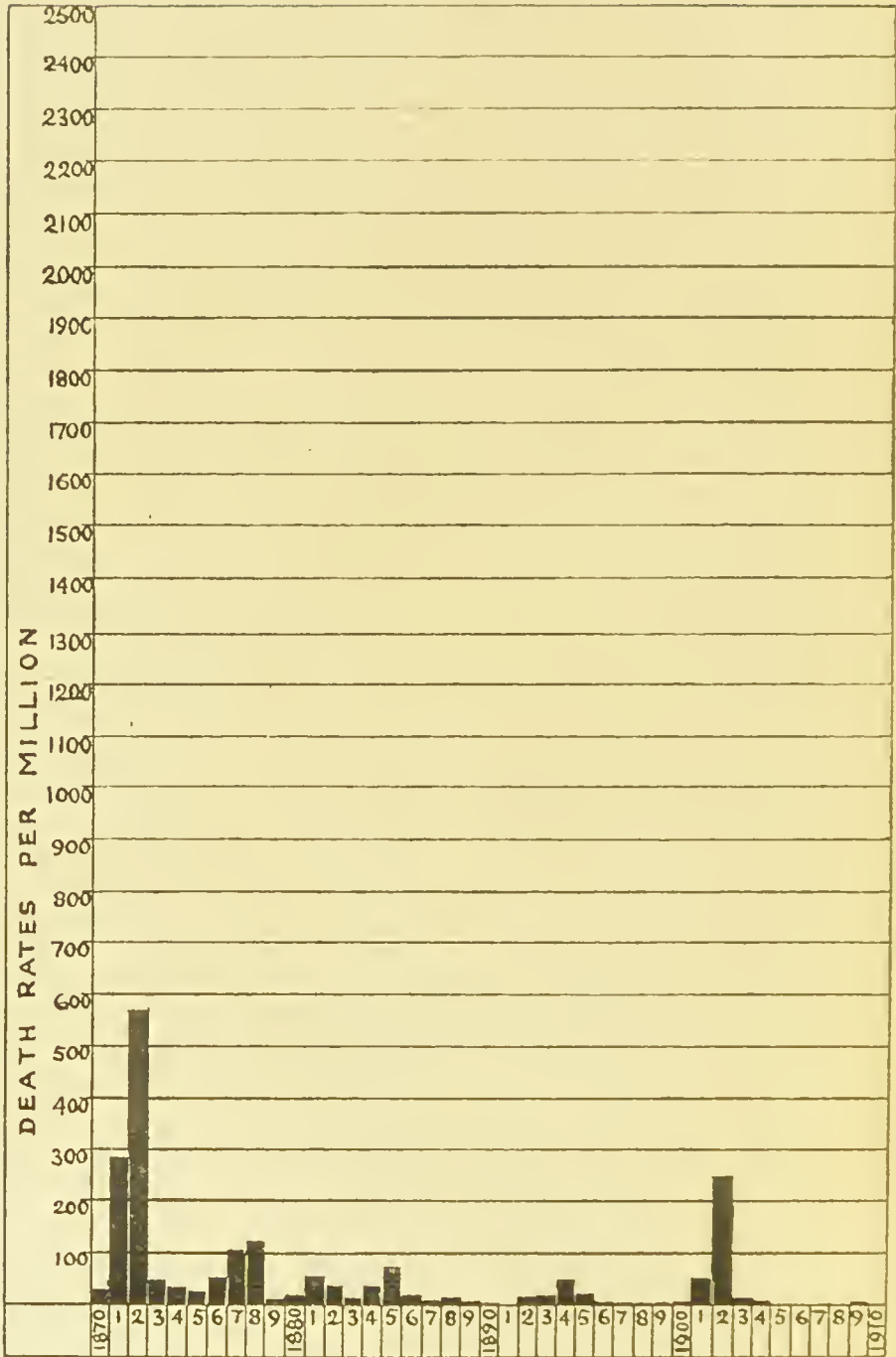
LONDON

SMALL-POX



Showing the death-rate per million persons living for the years 1870-1910.

KENT
SMALL-POX



Showing the death-rate per million persons living for the years 1870-1910.

APPENDIX V

APPENDIX V

A Rough Table, referred to in Chapter X, on Public Health Organization, etc., showing in a summary form the present Working Staffs of London, the seventy-six other Chief English Towns, and the County Councils.

	Medical Officers of Health.		Bacteriologists.	Public Analysts.	Veterinary Inspectors.	Meat and Slaughter House Inspectors.	District Sanitary Inspectors.	Sanitary Inspectors and Food and Drugs Inspectors.	Female Sanitary Inspectors.	Disinfectors.	Infectious Diseases Inspectors.	Factory, etc., Inspectors.	
	Chief.	Assistants.										Male.	Female.
London County .	1	2	—	—	2	—	—	19	2	—	—	—	—
" City .	1	—	1	1	1	4	8	8	3	—	—	—	—
" Port .	1	5	—	—	—	—	10	3	—	—	—	—	—
" Boroughs	29	3	3	29	—	2	214	11	37	11	1	2	2
London Total .	32 + 10		4	30	3	6	232	41	42	11	1	4	
Seventy-six other Great Towns .	76 + 46		5	64	38	24	417	25	155	6	4	3	
County Councils.	59 + 21		1	30	66	—	16	2	35	—	—	—	—

The Directory referred to in Chapter X, p. 173, is the basis of the above information. As it is the first appearance of that volume, it can hardly be expected that the information would be so complete and exact as to admit of a thorough classification of all the different appointments under the various local government bodies. Still, the above Table brings to light some important facts bearing on the subject of this book. One is the comparatively small number of medical assistants to medical officers of health. The information offered under the headings "Bacteriologists" and "Public Analysts" is evidently insufficient, chiefly for the reason that it does not distinguish the public analysts who undertake bacterial diagnosis in addition to Food and Drugs work. The growth of the sanitary inspectors' department, and especially the addition of the female element, is highly significant. More discrimination is required as to the inspectors devoted to health visiting, under medical directions, for the purpose of discovering early cases of infectious disease, giving instructions, etc., disinfection work at the home, and at disinfecting stations.

There is the large field of work occupied by the departments of district councils, whose officials and inspectors are even more numerous than are those of the authorities contained in the above table. We cannot, however, offer even an outline table of these, as the materials for classification barely exist.

The editor of the Directory is to be congratulated on his first edition. It already furnishes a large amount of useful information. Its value would, however, be enhanced if, in a further edition, the appointments could be classified for the three parts of the United Kingdom. Very important, too, is the differentiation of sanitary inspectors in England according to the nature of their

appointments, viz., whether they are "independent" or "combined with those of surveyors." For it is under the circumstances of the latter kind of appointment that the work of dealing with the details of home sanitation is so apt to be overlooked.

In Ireland, where sanitary work is so much needed, it would be of further assistance if the machinery for dealing with "nuisances injurious to health" could be explained in a way that would facilitate comparison with those of Scotland and England. In the fight against consumption and other infectious diseases, in which the Earl and Countess of Aberdeen have taken so noble and leading a part, there can surely be no more powerful agency than that directed to the remedy of home conditions, in particular those arising from dirt and dampness of the dwelling, whether in its foundations or any part of its structure.

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